Watershed Condition Summer of 2000

Baca Location 1 Purchase

Valles Caldera National Preserve



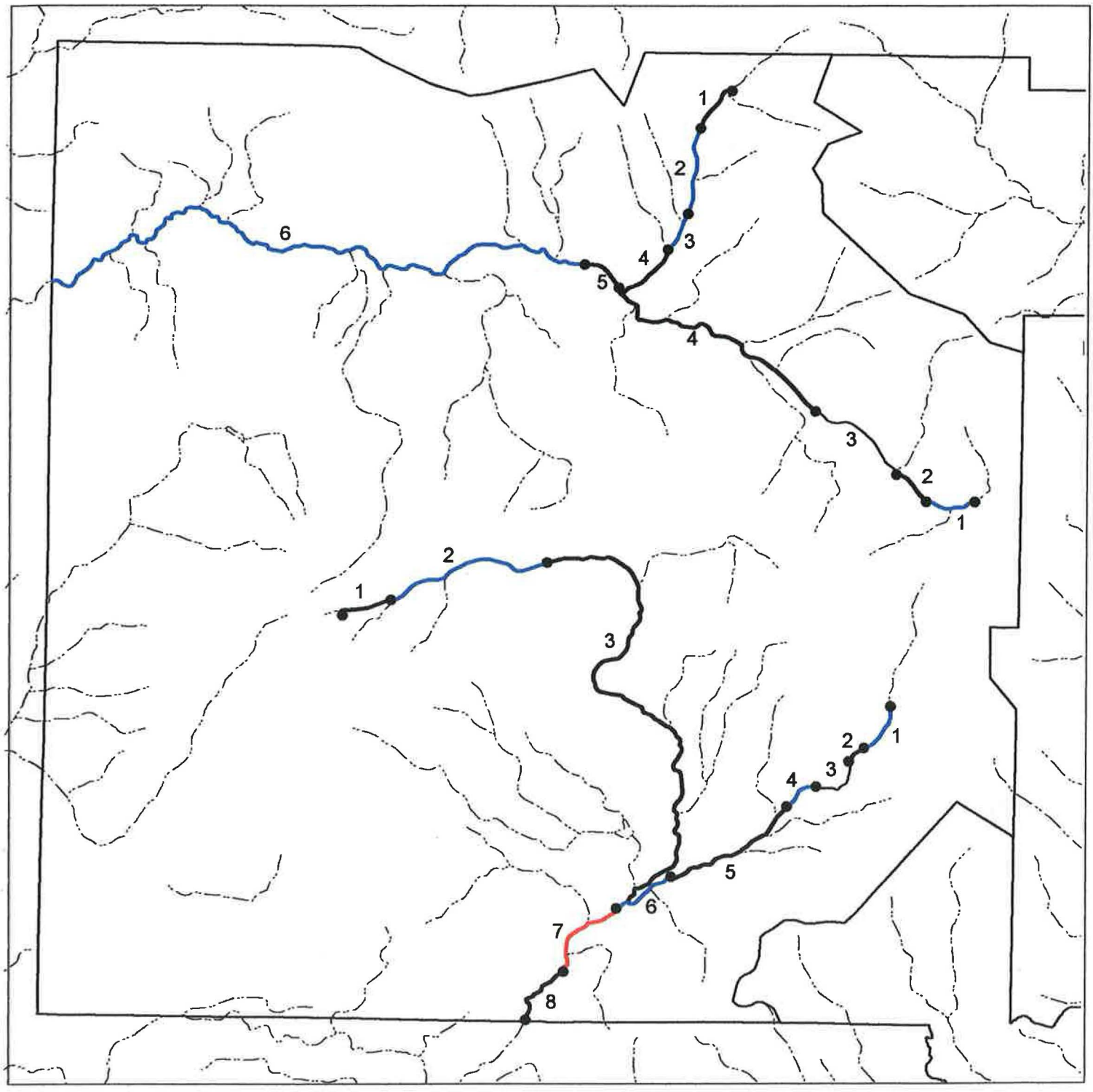
EXECUTIVE SUMMARY
VCNP ASSESSMENT
April 13, 2001

A rapid assessment of conditions on the 89,000-acre Valles Caldera National Preserve (VCNP) was conducted to show the situation at the time of transfer from private to public ownership. This provided information for the caretaker (Santa Fe National Forest) to see potential problems in the interim period before the Board was appointed and the ability to brief the Board on January 11, 2000 on conditions that the Board will assume management responsibility.

Riparian/wetland areas along major perennial systems were selected to reflect conditions over the larger upland area of the VCNP. The assessment used a coarse filter qualitative assessment (Proper Functioning Condition/PFC) to cover the area rapidly and locate reference reaches for a quantitative assessment (Thalwag Watershed Area Link/T-WALK) and benthic sampling.

The VCNP has a history of use and that is reflected in the assessment findings. The assessment indicated that the VCNP had areas of impairment on many reaches that impact structure, function, stream health, and biotic potential of the riparian/wetland areas. These observed conditions offer a decision space between existing and a variety of potential desired conditions.

Steve McWilliams
Watershed Program Manager
Santa Fe National Forest
April 20, 2001



Watershed Condition Assessment
- Non-functioning
- Functioning at risk
- Proper Functioning Condition
- Non-riparian
- ●1 Segment end & #
- Hydrology
- Ownership boundary

N

1 0 1 2 Miles

1 0 1 2 3 Kilometers

11/2001 vcnp.apr

Water

The development of fluvial systems through geomorphic processes has been under study for many years and a logic framework of the processes has evolved (Leopold, 1964). Watersheds as geographic areas are optimal organizing units for dealing with the management of water and closely related resources. Specific watershed problems must be approached in distinctive ways and determining the appropriate scale for the resolution of any problem is an essential first step (National Research Council, 1999). There are fundamental principles of river systems that reflect themselves in what we see on the landscape. River form and fluvial processes evolve simultaneously and operate through mutual adjustments toward self-stabilization (Rosgen, 1996). It is widely recognized that watershed changes that significantly alter stream flow timing and quantity would change channel characteristics and stability. The VCNP contains the headwaters of the Jemez River, which is comprised by the upper reaches major perennial tributaries. A crew comprised of a hydrologist, soil scientist, fisheries, and vegetation specialist assessed the major perennial drainages (East Fork, San Antonio, Jaramillo Creek, and Rio de los Indios) using PFC, a qualitative (non value driven) process (Pritchard, 1995). This was conducted to determine the condition of the Baca Location at the time the Santa Fe National Forest was assigned as the caretaker of the property. Though PFC we located reference sites where a more quantitative analysis was conducted. Characteristics of a reference site was a reach that was properly functioning, bankfull flow within a stream type was appropriate for the landscape, could access the historic floodplain, stable late seral vegetation, hydrologic, and edaphic indicators. To obtain base stream health assessment, District, Forest, and Regional hydrologists conducted the Thalwag Watershed Area Link (T-WALK) at the reference sites. Water column properties used a bentic survey cerigate to assess impairment.

Findings:

During the 1960s-70s geothermal exploration occurred in the VCNP. Several wells were drilled across the VCNP. Some are currently leaking which add surface water to systems that did not develop under current flow regimes. Of particular concern is a wellhead on San Antonio Creek within the Valle Toledo. This well is supplying several times the flow rate of the

existing drainage. This has produce changes in the stability to the channel across the Valle San Antonio. There are also water rights implications within the adjudicated Jemez sub basin as the rate of flow would exceed the current subsurface water rights on the property and over the last 20-30 years this flow has been expected by down stream users.

Different species have varying ability to resist water flow and maintain stable banks (Winward 2000). Several processes effect the physical functioning of riparian /wetland systems (Pritchard, 1998). These processes can be grouped in hydrologic, edaphic/erosional, and vegetative. Inadequate bank protection was a dominant finding across many segments. This was due to upland species (Kentucky Bluegrass, Redtop, pinedropseed, Arizona fescue, and others) making up a major portion of the riparian vegetation along many reaches (evident on the East Fork below the crossing of the headquartes road and on San Antonio Creek within the Valle San Antonio) (Porter, 1988). Sediment levels were in excess of pass through flow as evidenced by center bars and non-vegetated point bars along many reaches (appendix I). These fine sediments were a possible reason of impairment to the biotic resources along some segments and were observed to reduce the stream potential even at reference reaches.

Natural and manmade drainage structures are hydrologic modifiers and effect water flow. These channel structures provide lake (lentic) systems along river (lotic) systems. Beaver dams are an example of a natural drainage structure, which were found on the VCNP. When occupied and maintained the beaver dam offers an effective hydrologic modifier that stabilizes a given reach and affects the local plant community. Abandon beaver dams are unstable and pose resource concerns of down cutting and sedimentation (middle reaches of Rio de los Indios). Stock tanks are a man made feature that provided water for wildlife and livestock across the VCNP and provide controls on flow. Some of the 154 recognized developments have breached (lower end of Rio de los Indios) or reduced their storage capacity through sedimentation.

Roads are a hydrologic modifier, which effect water flow across the landscape. They concentrate water and increase the potential for erosion. Roads that are directly connected to the stream system effectively increase the drainage density of the area and allow for greater potential for sedimentation into the stream system. Roads are a major influence across the VCNP. Some of these roads have vegetated and returned to near natural

conditions (Valle Seco/Valle Santa Rosa). Many miles of roads with poor alignment or inadequate drainage on steep slopes remain and adversely impact site productivity through erosion and sedimentation (Redondo, Redondo Border & Puerta de Trasquilar). The crossings of major drainages have either low water crossings (Valle Santa Rosa to Valle San Antonio) or have old log crossings that are decaying such as at the west end of the Valle San Antonio. Adequate sizing and spacing of culverts have been shown to reduce the concentration of flow and the resultant erosion (Water/Road Interaction Technology Series). Culverts on the VCNP are few and most are under sized.

Woody riparian plants found in the Jemez such as thin leaf alder, Bebbs willow, mountain willow, and narrow leaf cottonwood offer increase bank stability and riparian structure (Correll. 1972). Due to the low stream gradient woody plants might not be expected in the large open valleys but as stream gradient increase the expectation of woody species should increase. These species are evident just off the VCNP on National Forest System lands and offer variety to the riparian/wetland ecosystem. Woody riparian vegetation on the VCNP is limited to the higher reaches in the watersheds and dominated by a few mature plants. This limited extent may not offer support for riparian/wetland protection as a more climax community might offer.

Soils

Soils develop over time through pedogenic processes (pedogenesis). This development produces the concept of a pedon, natural three-dimensional body having similar properties. Through the comparison of like and dislike observable attributes, soils can be classified and a taxonomic system applied. On the Santa Fe National Forest soils were inventoried as ecological units in the Terrestrial Ecosystem Survey (TES). This method considers soil genesis in an ecological context and combines the biotic and abiotic aspects of soils using climate and vegetation to form an ecological unit. Soil classification (Soil Taxonomy, USDA #436 1975), properties (National Soils Handbook and Terrestrial Ecosystem Handbook USFS, 1985), interpretations, and productivity are measured and inferred through the assessment by TES. Scientific planning for soil conservation and water management requires knowledge of the relationships among those factors that cause loss of soil and water and those that help to reduce such losses (Renard, 1997). Investigations into erosional processes and efforts to model the predicted

rates have resulted in factors of slope length, soil erodibility, slope steepness, practices, and cover. In most wildland situations such as on the VCNP, cover is the variable that can be affected by management or activities. Cover, effective cover, that influences erosion is the litter (greater than ½ inch), basal parts of plants, and surface rock.

Findings:

The soils in the valley positions within the VCNP are similar to mapping unit 8 on the TES survey of the Forest. Mapping unit 8 is an association of three dissimilar soils, which occur in a repeatable pattern that can be discerned over the landscape (soil association). The soils extend from adjacent to the aquatic up slope to a drier upland position near the stream. This mapping unit includes a hydric soil (Cumulic Haplaquolls, fine-loamy, mixed) near the stream, an adjacent alluvial soil (Pachic Udic Haploborolls, fine-loamy, mixed), and a coarser textured hydric soil on alluvial benches and bars (Typic Haplaquolls, loamy-skeletal, mixed)(NRCS, 1996). The vegetation varies from carex species (Nebraska sedge, beaked sedge, beautiful sedge, grasses (hairgrass, Kentucky bluegrass, redtop, Arizona fescue, mountain muhly, and nodding brome), alder (thinleaf), willow (Bebbs and scouler/mountain). This soil has a high revegetation potential.

Areas of disturbance from past activities can contribute to added sedimentation by accelerated erosion if the path transferring the water to streams has inadequate buffering capacity to catch the sediments. These areas increase the sediment source areas and add to peak flow (T-WALK, 1998).

Estimated production potential of plant biomass in the form of herbaceous plants in mapping unit 8 varies from 6500 pounds per acre near the stream to 3750 pounds away from the stream and 100 percent effective ground. The current production of plant biomass in the valley position is less with around 20 percent bare ground toward the uplands (Terrestrial Ecosystem Survey for the Santa Fe National Forest 1993).

This assessment indicates a decision space between the existing condition and a possible desired condition. There is a possibility for management to effect change where riparian/wetland condition, stream channel attributes, hydrologic response, and vegetation/soils lead to improved watersheds.

Definitions:

Proper Functioning Condition (PFC):
Riparian/wetland areas that have adequate vegetation, landform, or large woody debris present to dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid flood plain development; improve water flood water retention and ground water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian/wetland areas is a result of interaction among geology, soil, water, and vegetation.

Functional- at risk (FAR):
Riparian/wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

Nonfunctional (NF):
Riparian/wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc.

Riparian/wetland:
Riparian: Form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical of riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.
Wetland: Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which, under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

This is not a jurisdictional wetland definition that has specific soil/water/vegetation requirements (Corps of Engineers. 1987)

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VALLES CALDERA NATIONAL PRESERVE

PROPER FUNCTIONING CONDITION ASSESSMENT

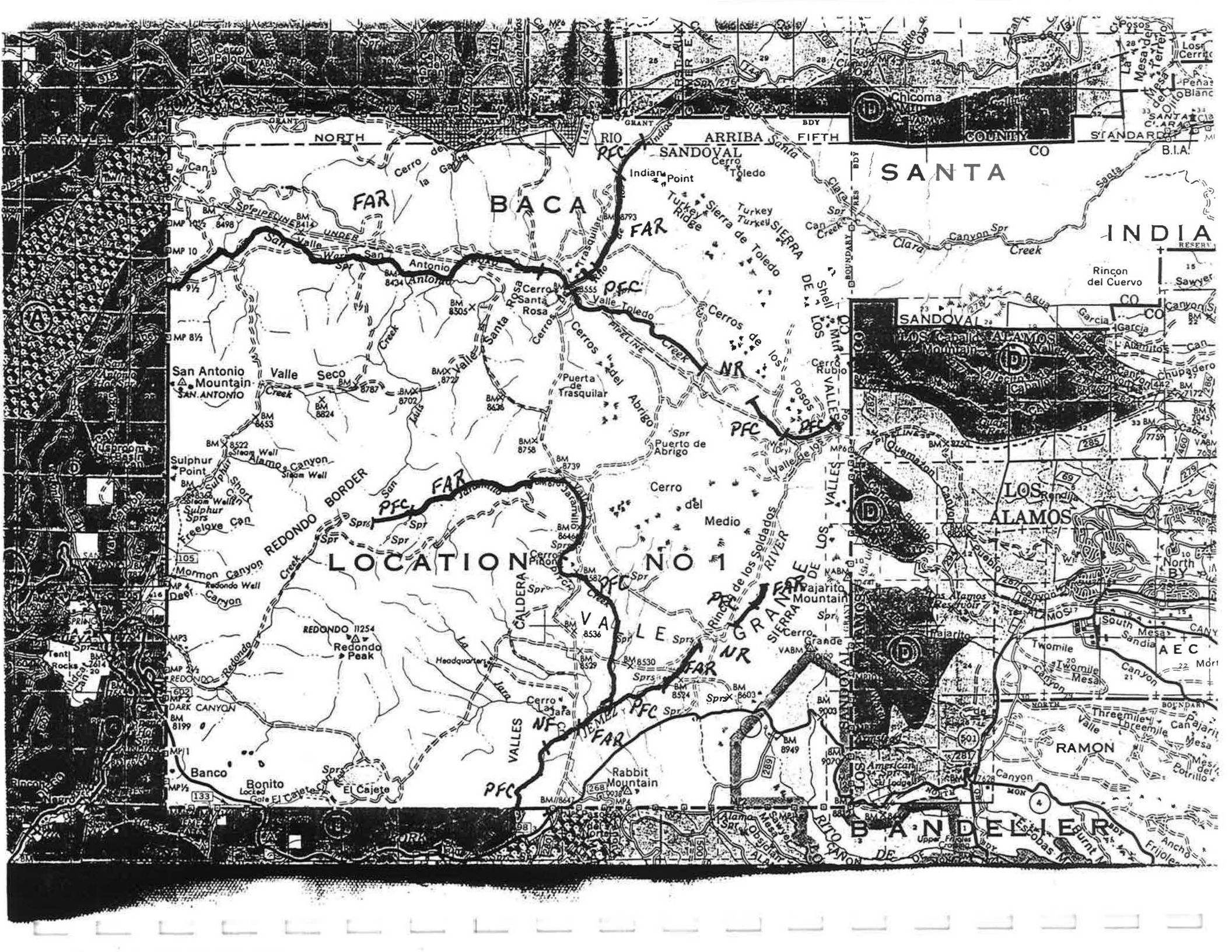
Conducted Summer 2000

Field work by:

Steve McWilliams
Anna Jaramillo
Alison Dean
Beth Sanchez

Compilation by:

Steve McWilliams


LOCATION NO 1
BACA
SANTA
INDIA
LOS ALAMOS
BANDELIER
RAMON
VALLE
GRANDE
SANDOVAL
NORTH
RIO ARRIBA
FIFTH
STANDARD
COUNTY
CO
B.I.A.
RESERV
BOUNDARY
FAR
PFC
NR
NF
BDY
GRANT
Cerro la Garita
Indian Point
Cerro Toledo
Turkey Ridge
Sierra de Toledo
Turkey Creek
Pipeline Under
San Antonio Valle Warm Spr
San Antonio Mountain
SAN ANTONIO
Cerro Santa Rosa
Cerros de los Posos
Valle Toledo
Pipeline Creek
Puerta de Trasquilar
Puerto de Abrigo
Valle Seco
Valle Santa Rosa Creek
Cerros del Abrigo
Cerro Rubio
Valles Caldera
Sulphur Point
Alamo Canyon Steam Well
Sulphur Spr
Sulphur Canyon
Freelove Can
Redondo Border
Mormon Canyon
Redondo Well
Deer Canyon
Redondo Creek
Cerro del Medio
Cerro Pinon
Caldera Creek
Rincon de los Soldados
Sierra de los Valles
Pajarito Mountain
Cerro Grande
Los Alamos Reservoir
Pajarito
Redondo 11254
Redondo Peak
Headquarters
Cerro La Jara
Dark Canyon
Tent Rocks
Banco Bonito
El Cajete
Rabbit Mountain
Rincon del Cuervo
Sawyer
Sandia
South Mesa
North Mesa
Twomile Canyon
Twomile Mesa
Threemile Canyon
Threemile Mesa
Pajarito Mesa
Potrillo
Ancho
Frijoles
Chicoma
Los Cerritos
Peñas Blancas
Mesa del Terrero
Cerro Pelon
Cerro Grande
Chihuahuenos
Rito de los Indios
Santa Clara Creek
Canyon Spr
Agua Garcia
Los Caballos Mountain
Alamitos Can
Chupadero Canyon
Quemazon Canyon
Pueblo Canyon
Rendija Canyon
Valle de los Posos
Valle de los Soldados
Rito de los Frijoles
Upper Frijoles Crossing
Obsidian
Alamo Spr
Pasco del Norte
Los Alamos Ski Lodge
Old American Spr
Ski Lodge
Burnt Mesa
Escobas Mesa
Mesa del Buey
Mesa del Rito
Mesa del Cañon
Mesa del Valle
Mesa del Potrillo
Mesa del Frijoles
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East Fork Jemez Creek

Segment 1 extends from above the stock tank (35 degrees 53.216 minutes north; 106 degrees 25.660 minutes west) to (35 degrees 52.750 minutes north; 106 degrees 26.017 minutes west) to an ephemeral drainage coming from the northwest. This segment is functioning at risk with no apparent trend. Conditions observed that were of concern include: vertical stability, sedimentation, and adequacy of riparian species for bank protection.

Segment 2 extends from (35 degrees 52.750 minutes north; 106 degrees 26.017 minutes west) to an exposed hill slope near (35 degrees 52.596 minutes, 106 degrees 26.218 minutes). This segment is intermittent and properly functioning.

Segment 3 extends from (35 degrees 52.596 minutes north, 106 degrees 26.218 minutes west) to near rock outcrops at (35 degrees 52.310 minutes north; 106 degrees 26.657 minutes west). This segment is ephemeral non riparian.

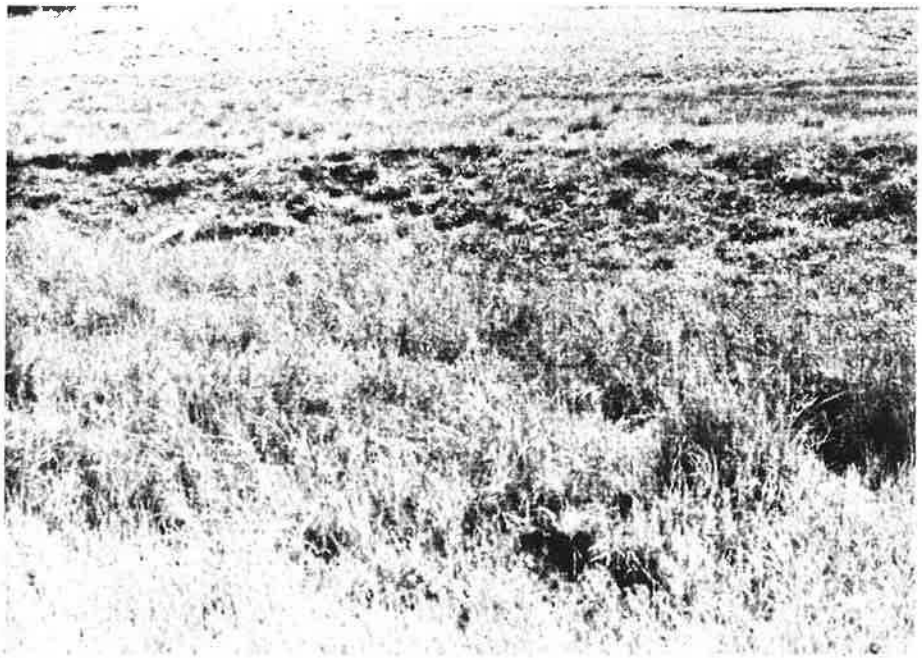
Segment 4 extends from (35 degrees 52.310 minutes north; 106 degrees 26.657 minutes west) to a stilling well near (35 degrees 52.082 minutes north; 106 degrees 27.058 minutes west). The segment begins at a spring that is the start of the perennial portion of the East Fork. This segment is functioning at risk with no apparent trend. Conditions observed that were of concern include: sinuosity/width/depth ratio, stream bank vegetation composition, adequate vegetation, flood plain characteristics, lateral stream movement, and sediment balance.

Segment 5 extends from (35 degrees 52.082 minutes north; 106 degrees 27.058 minutes west) to break in channel gradient at (35 degrees 51.281 minutes north; 106 degrees 28.621 minutes west). This segment is properly functioning and contains the reference reach for the East Fork.

Segment 6 extends from (35 degrees 51.281 minutes north; 106 degrees 28.621 minutes west) to near the headquarters road crossing (35 degrees 50.917 minutes north; 106 degrees 29.358 minutes west). This segment is functioning at risk with an upward trend. Conditions observed that were of concern include: sinuosity/width/depth ratio, riparian area widening, adequate riparian vegetation, lateral stream movement, and sediment balance.

Segment 7 extends from (35 degrees 50.917 minutes north; 106 degrees 29.358 minutes west) to near entering a narrow canyon at (35 degrees 50.205 minutes north; 106 degrees 30.064 minutes west). This segment is non-functioning. Conditions observed that were of concern include: incision of riparian/wetland area, adequate riparian vegetation, flood plain characteristics, and sediment balance.

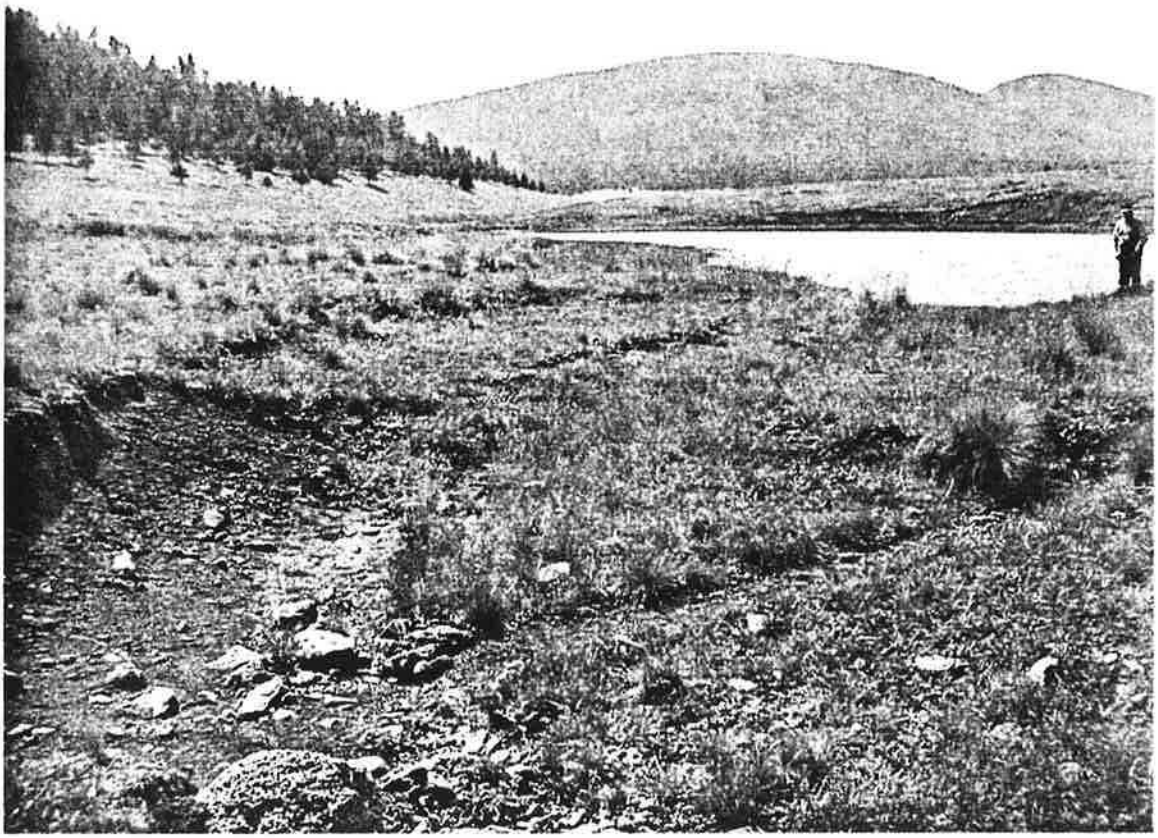
Segment 8 extends from (35 degrees 50.205 minutes north; 106 degrees 30.064 minutes west) to the boundary near (35 degrees 49.655 minutes north; 106 degrees 30.574 minutes west). This segment is in properly functioning condition.



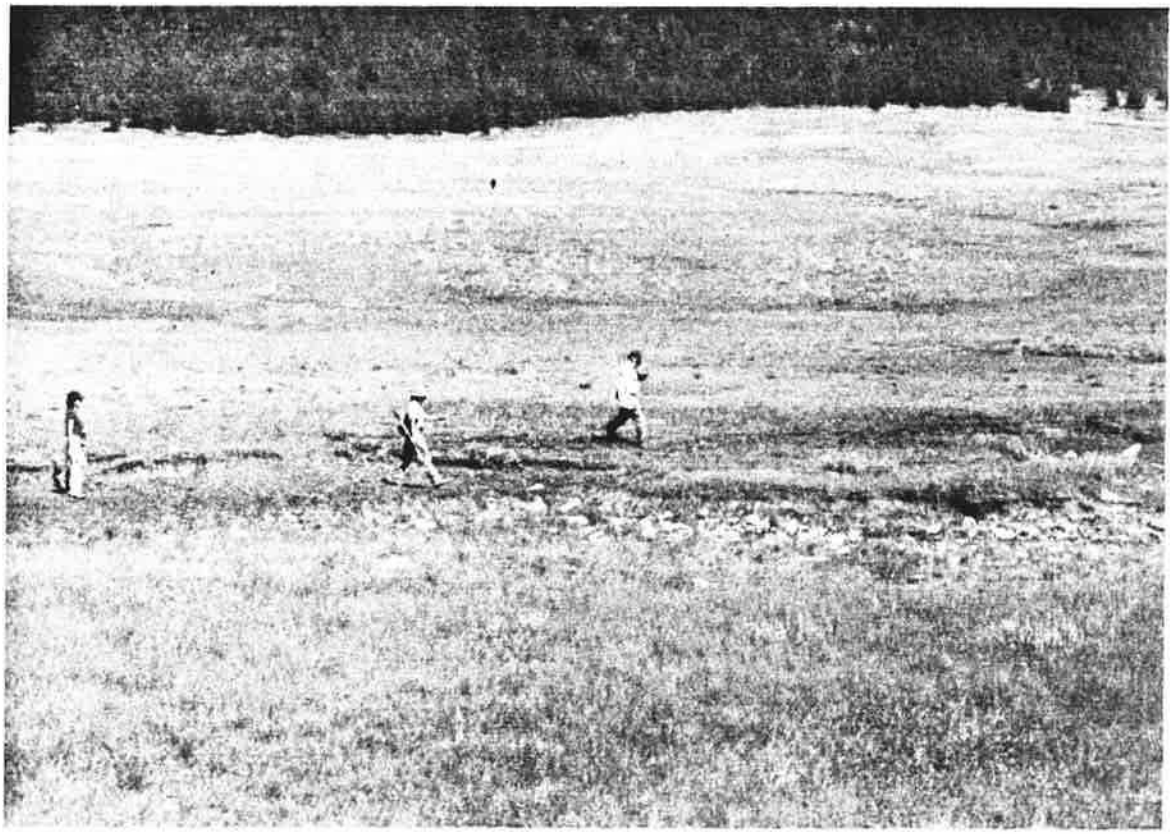
East Fork start reach 1 FAR



Segment #1 East Fork N 35 53.216' W 106 25.660'



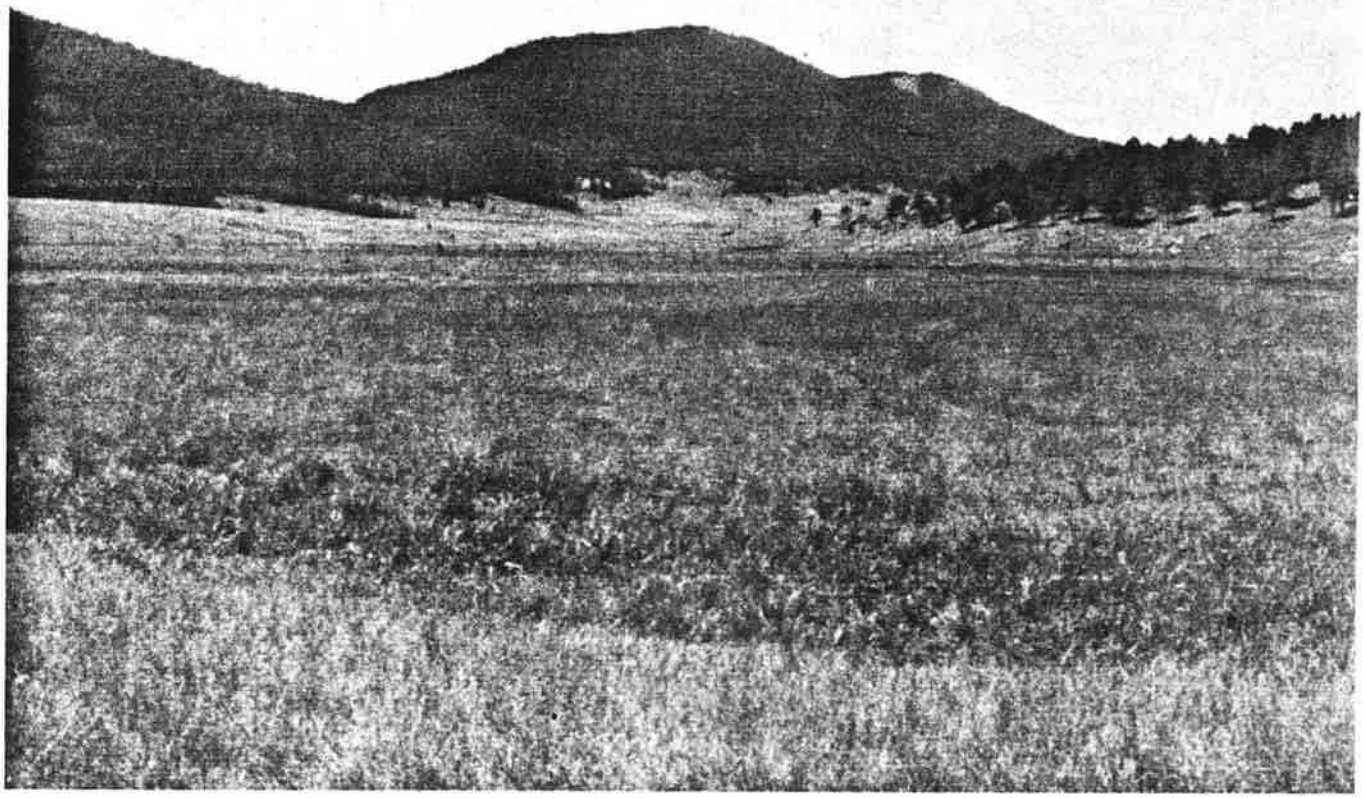
East Fork reach 1FAR above stock pond



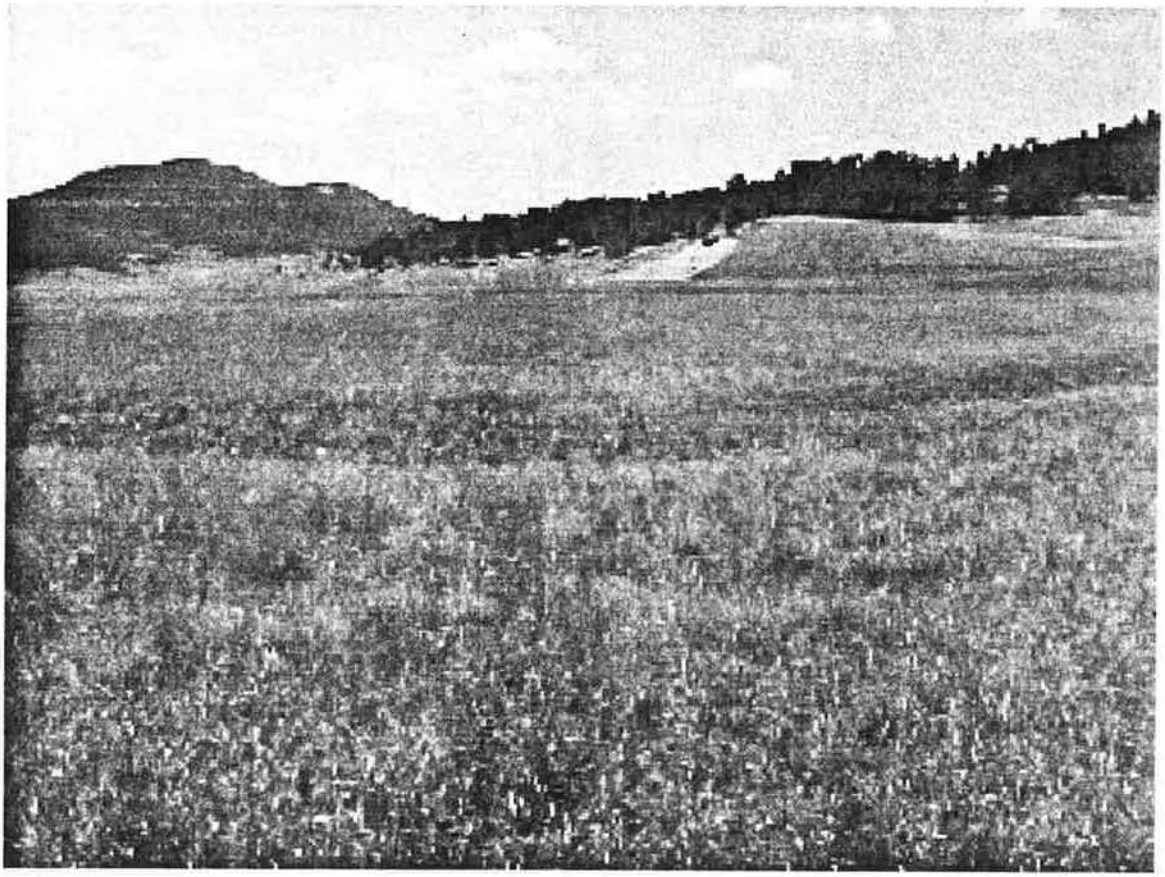
East Fork Jemez segment 1 FAR



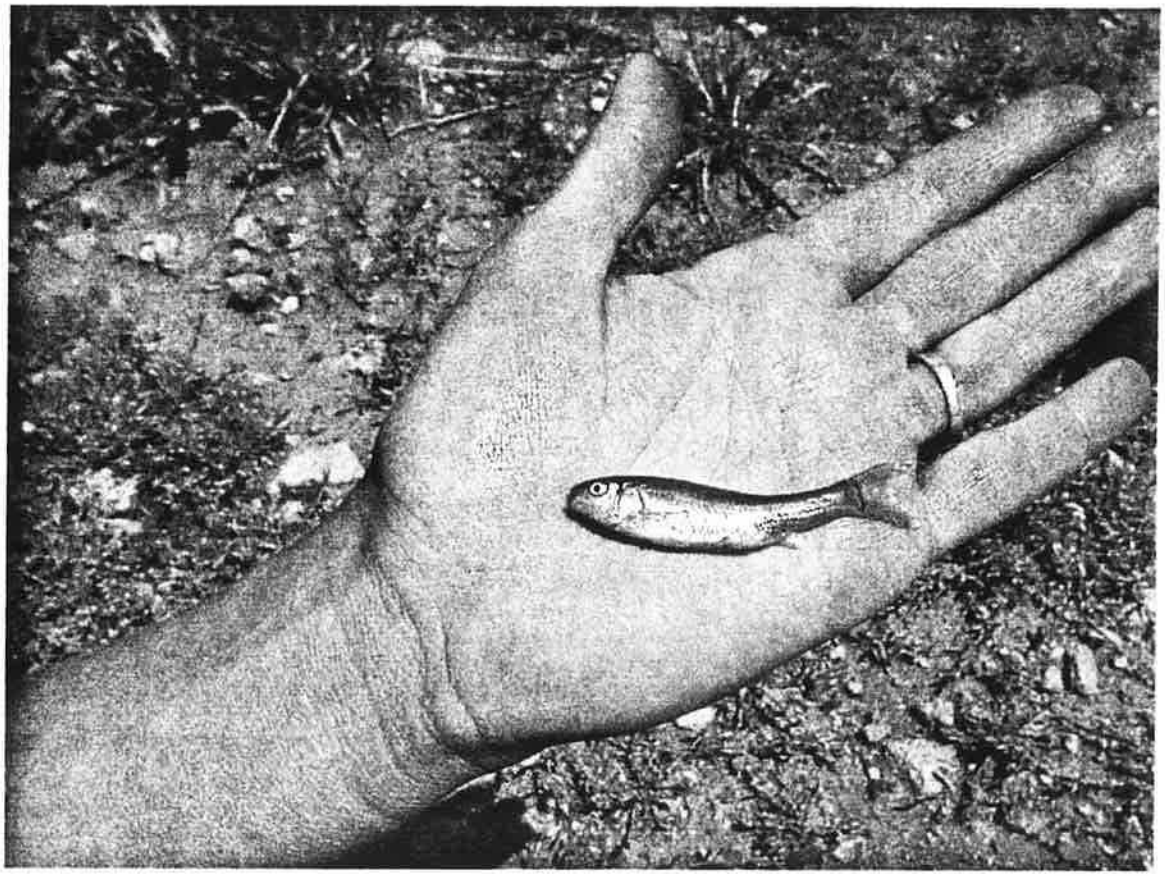
East Fork segment 1 FAR



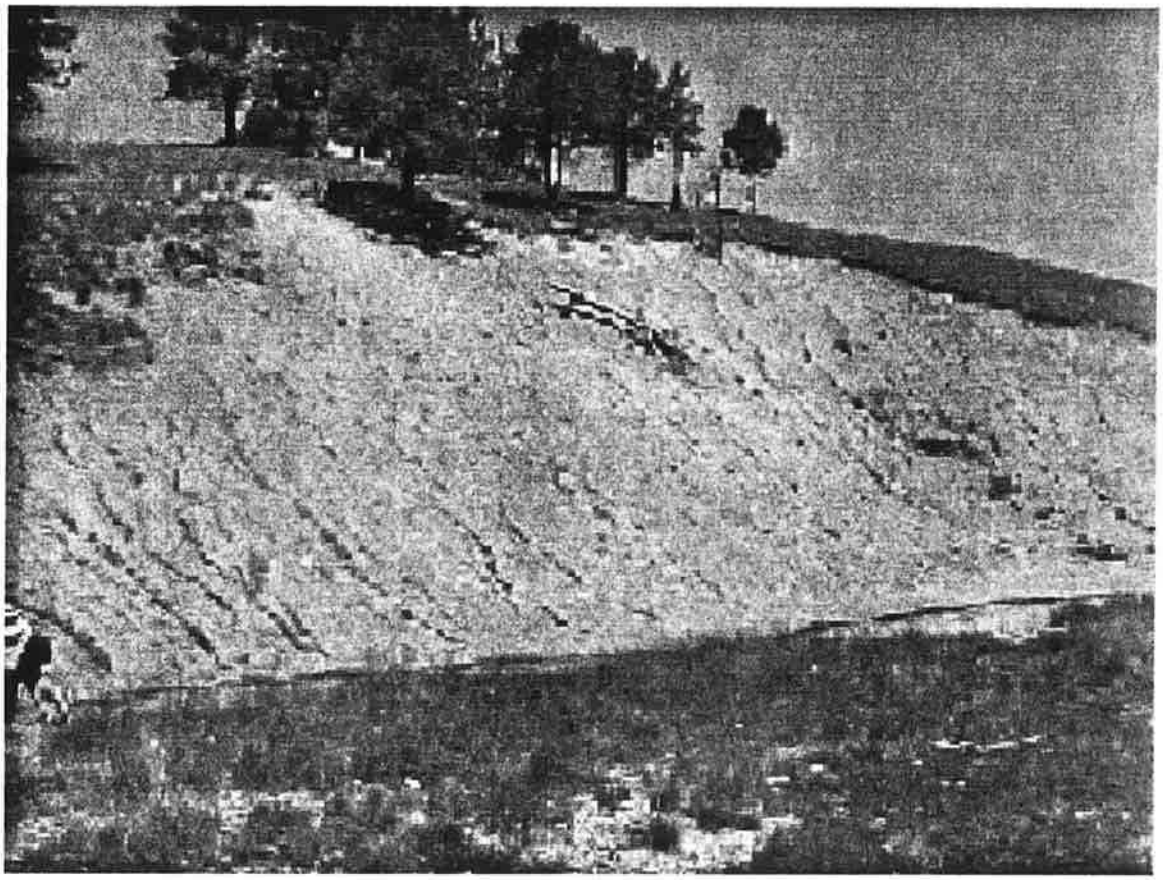
East Fork segment 2 overview



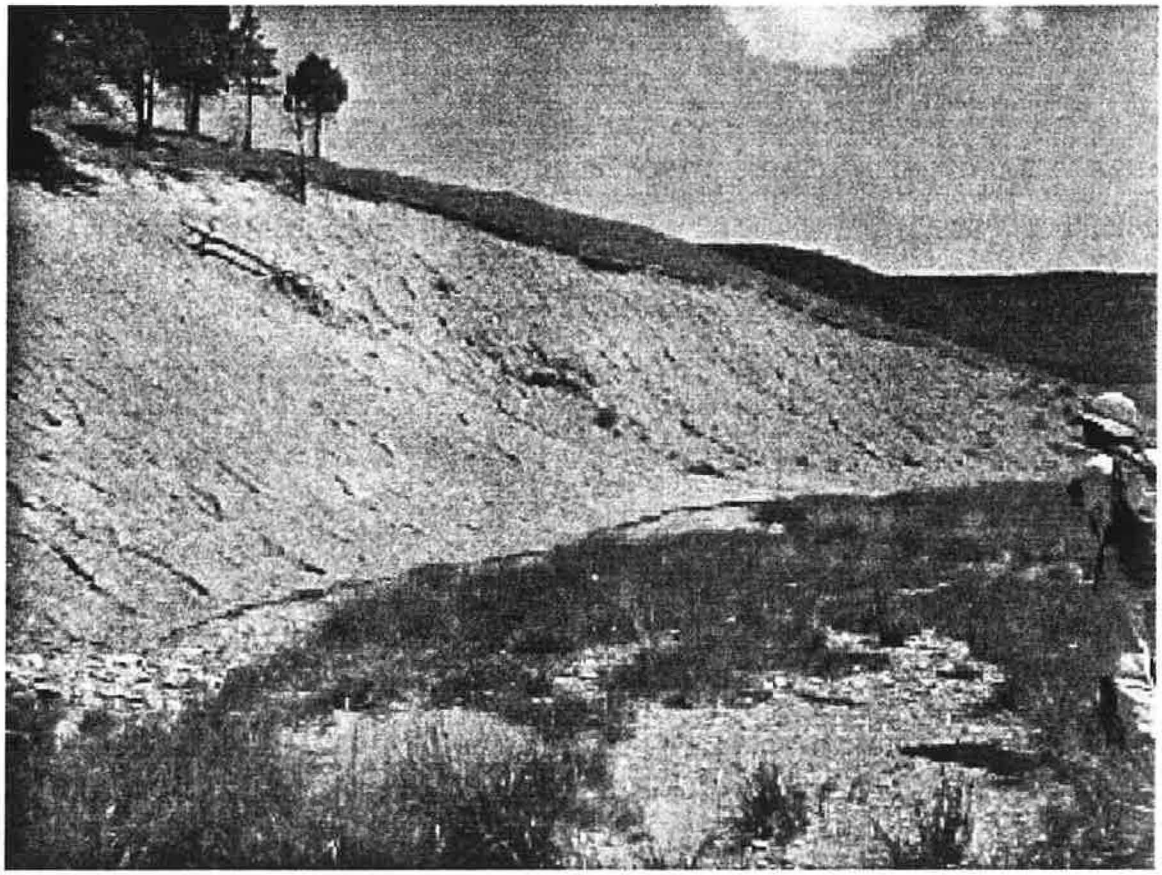
Segment #2 East Fork Proper Functioning (N 35 52.75' W 106 26.013').



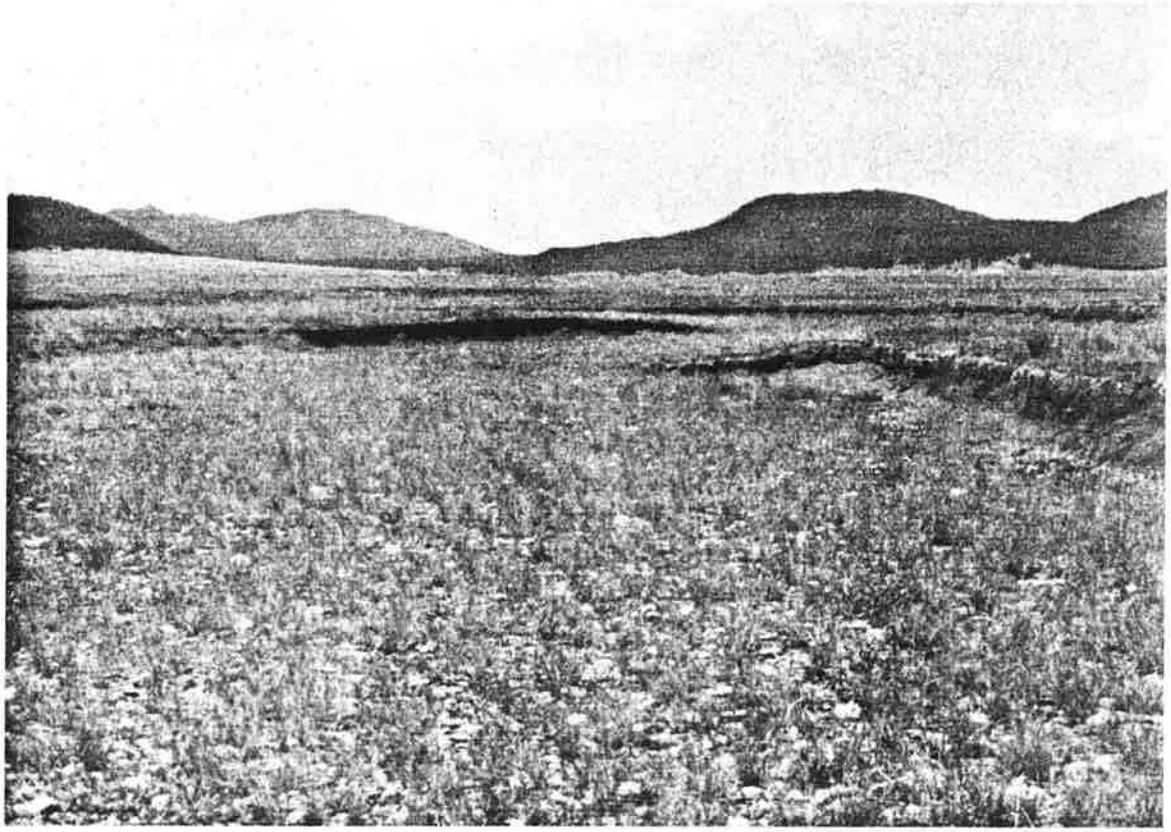
East Fork segment 2 dase



Start of Segment #3 East Fork (N 35 52.596' W 106 26.218').



Segment #3 East Fork 8/1/2000. Start of segment hillslope contributing sediment to reach.



East Fork segment 3 Non Riparian



East Fork Segment 4 8/1/2000 (N 35 52.310' W 106 26.657'). Spring fed reach.



East Fork Segment 4 8/1/2000. Emergent vegetation and aquatic species present in reach. Bank stability and non riparian vegetation component.



East Fork Jemez segment 4 spring source Bank stability, plant community, stream/sediment balance and lateral movement are subjects of concern along this functioning at risk no apparent trend segment.

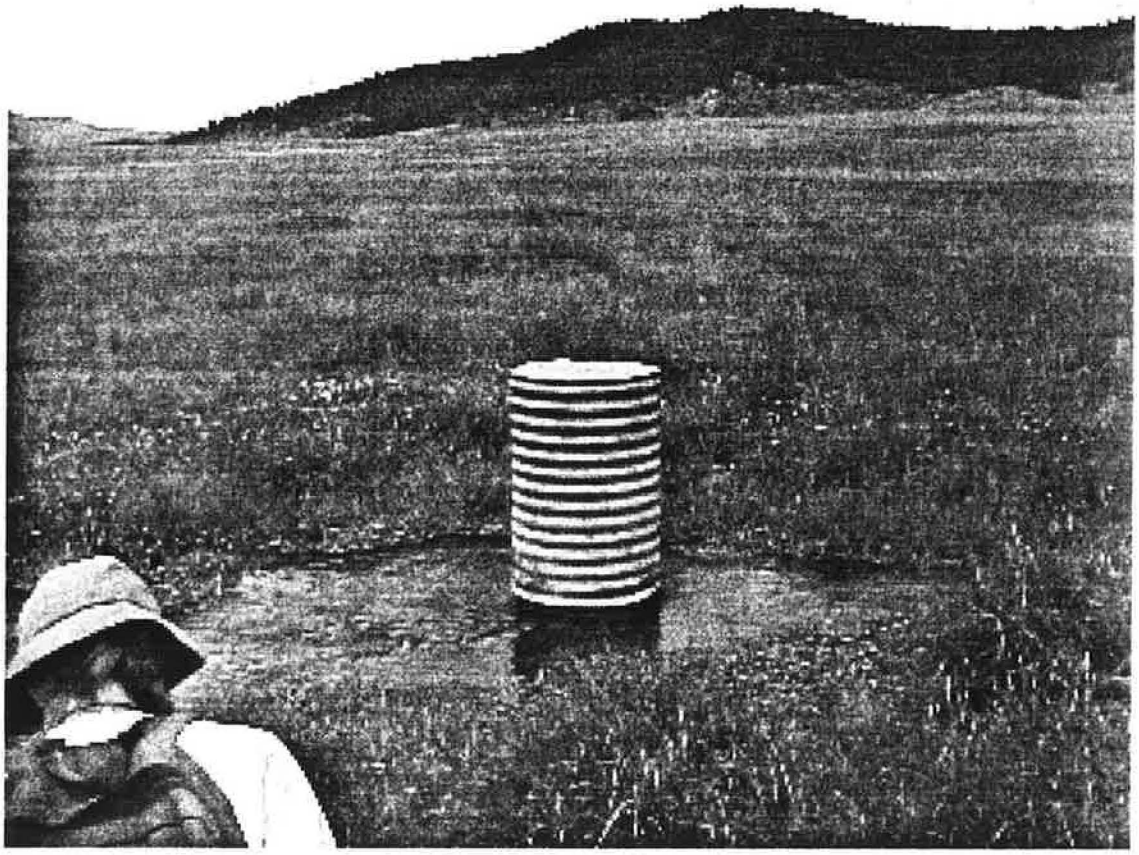


East Fork segment 5 PFC well head



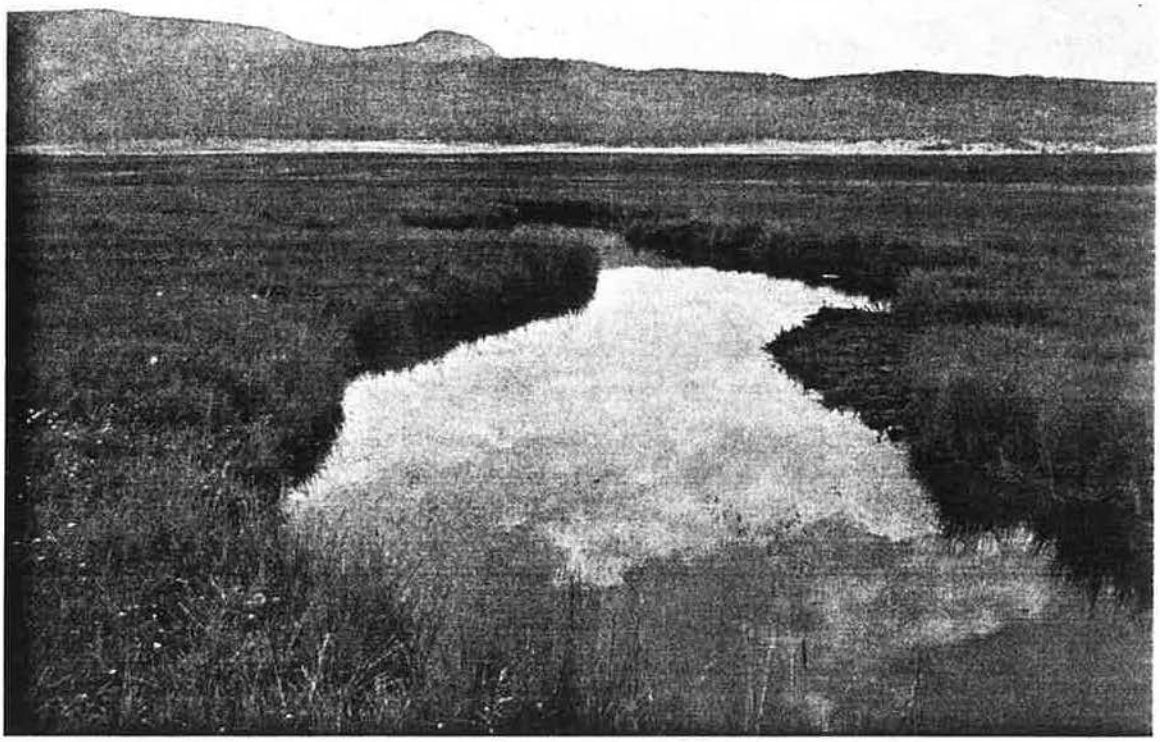
East Fork segment 5 PFC reference reach

Beak sedge



Reach #5 East Fork 8/1/2000. End of reach at retired USGS benchmark gauging station.

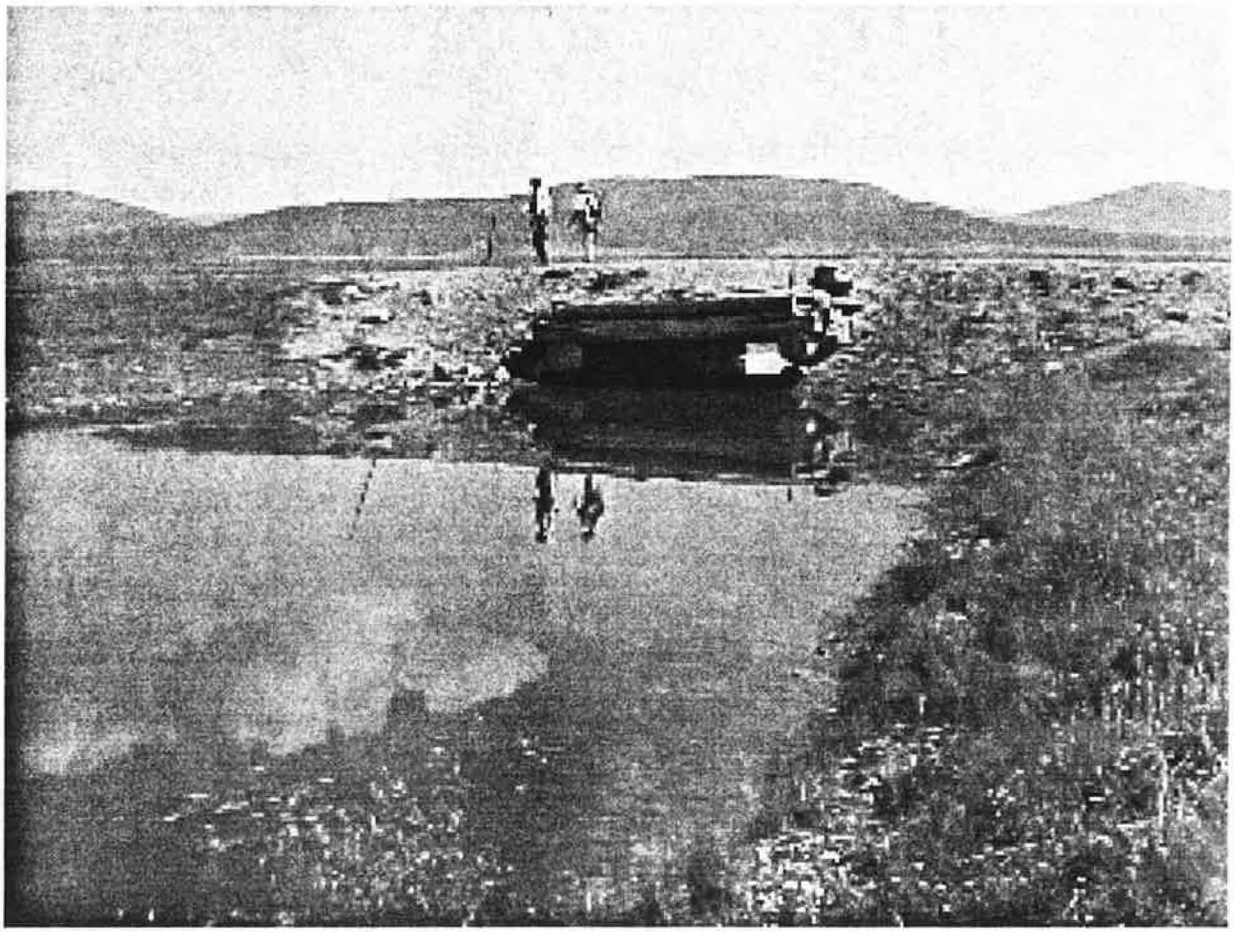
35 52.082' 106 27.058'



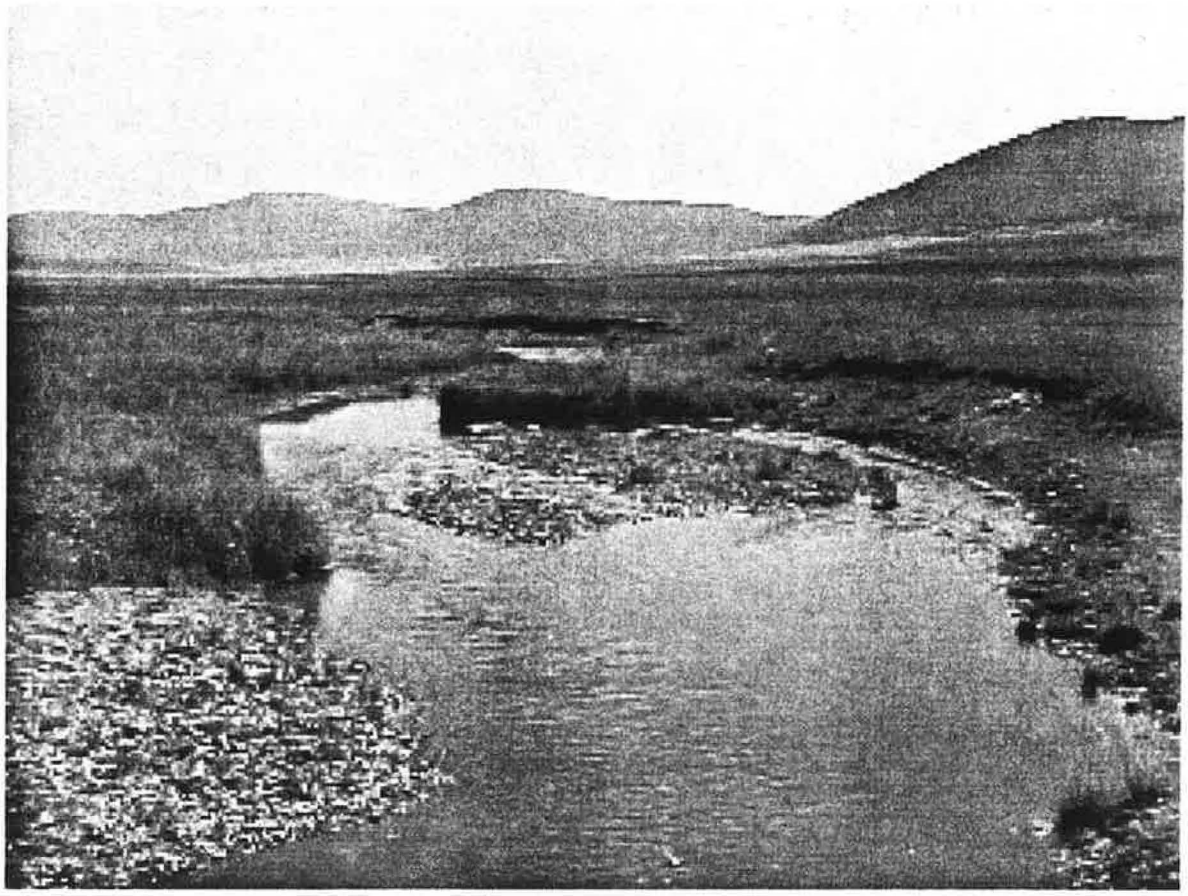
East Fork overview segment 5 start of 6



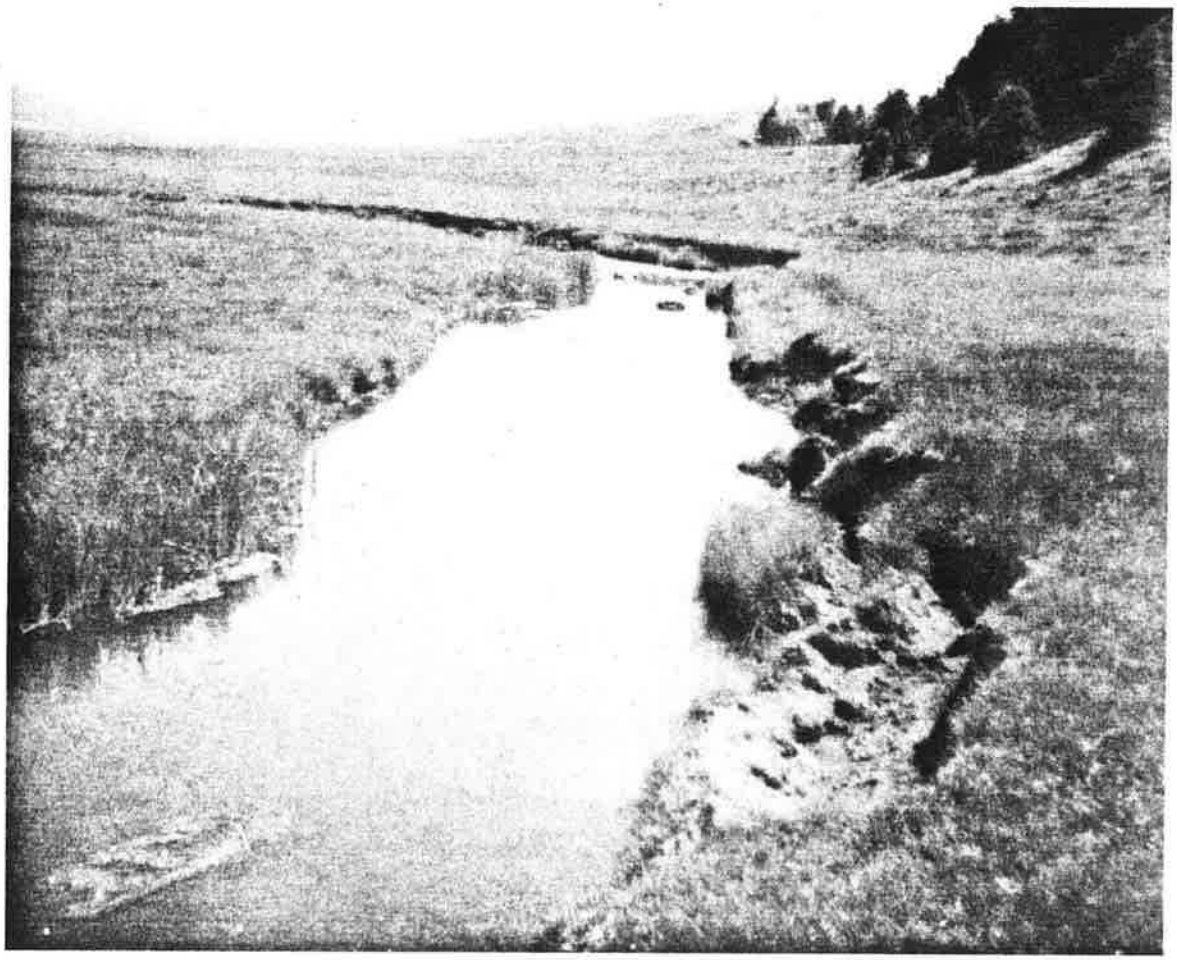
East Fork Segment 6 near headquarters road FAR



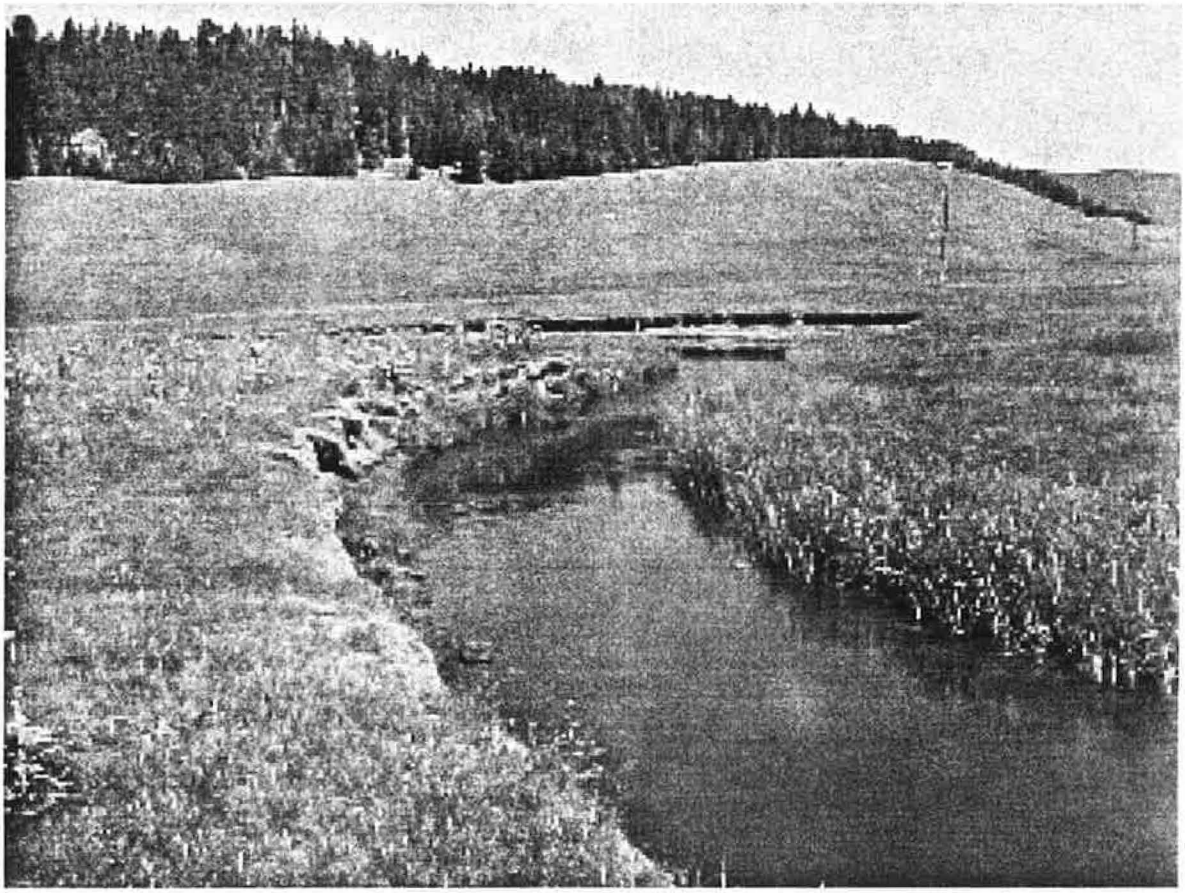
East Fork Segment 7 8/2/2000.



East Fork Segment 7 8/2/2000.



East Fork Jemez segment 7 Non Functional



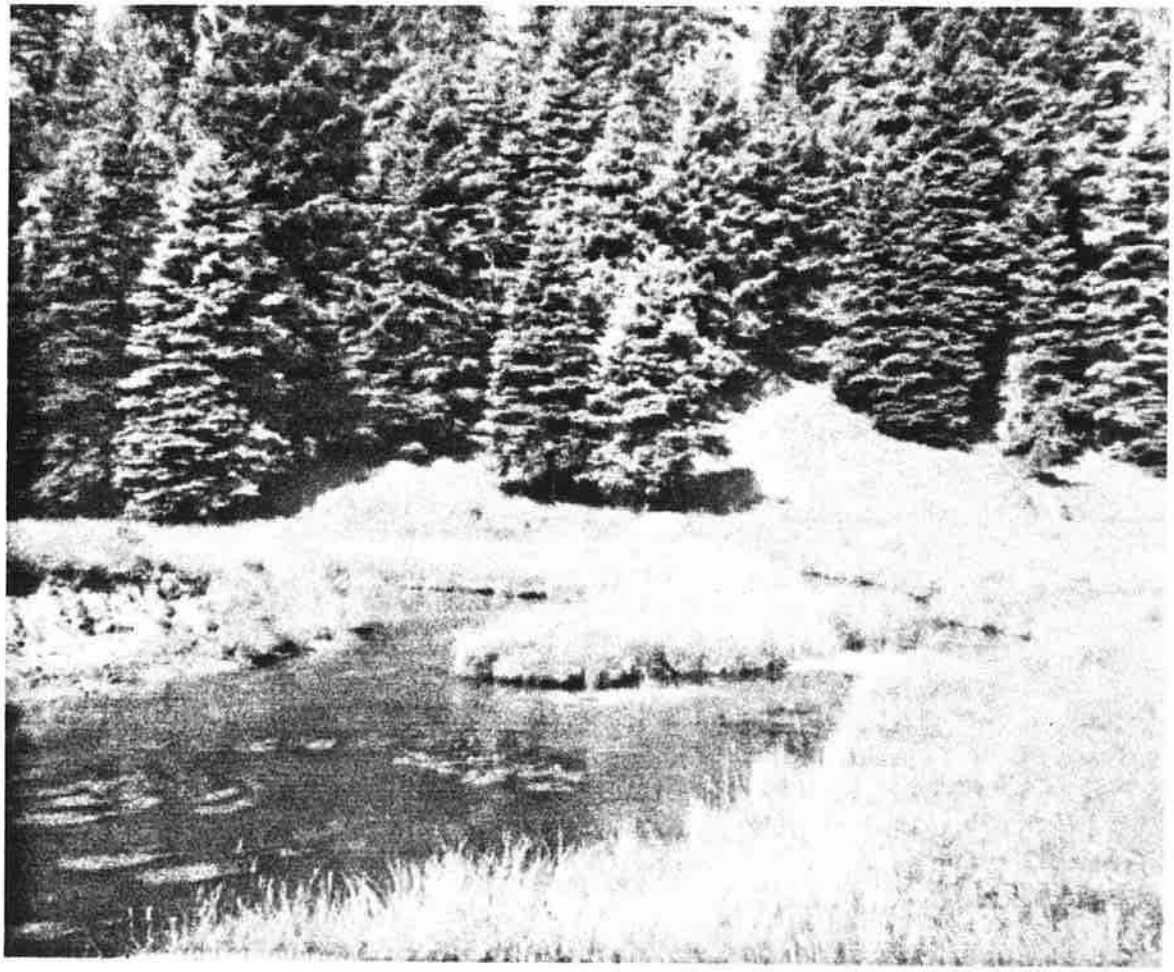
East Fork Segment 7 8/2/2000. End of segment.



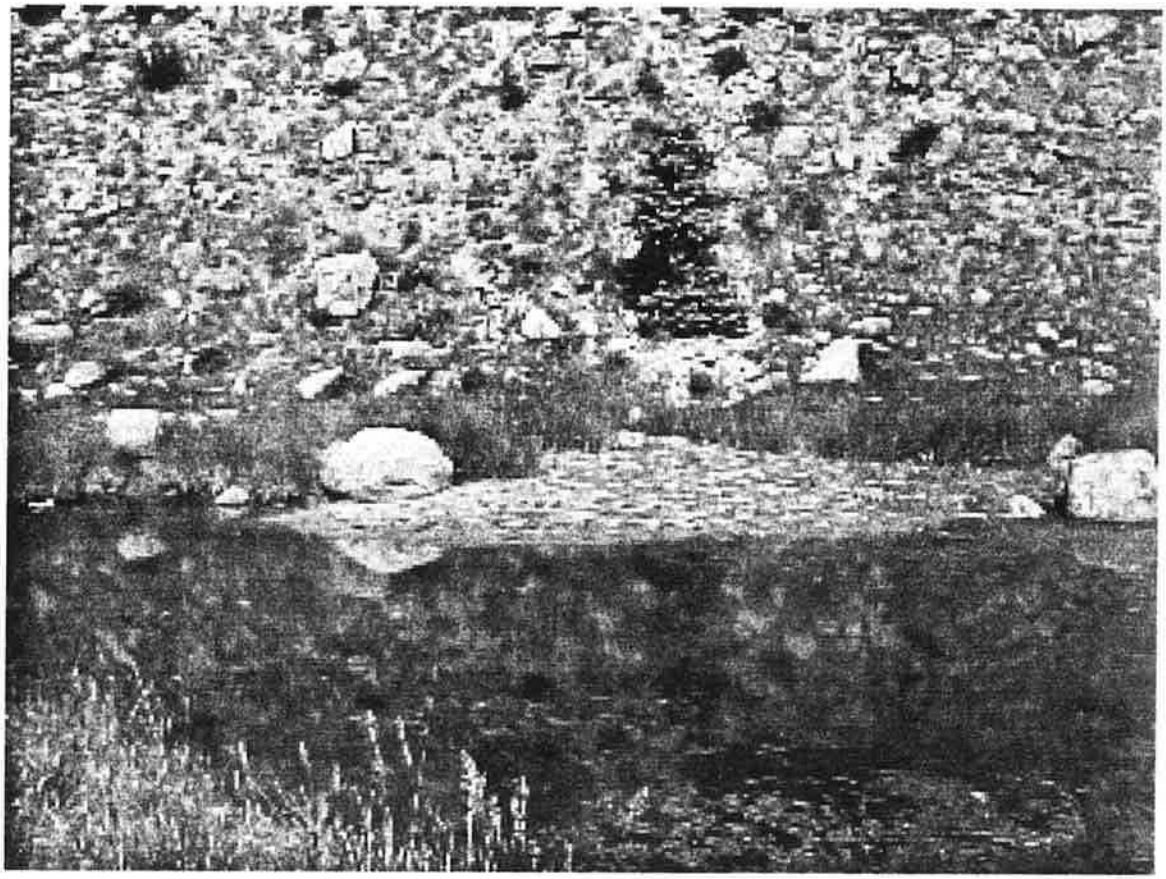
East Fork reach 8 PFC



East Fork Jemez segment 8 below boundary fence PFC



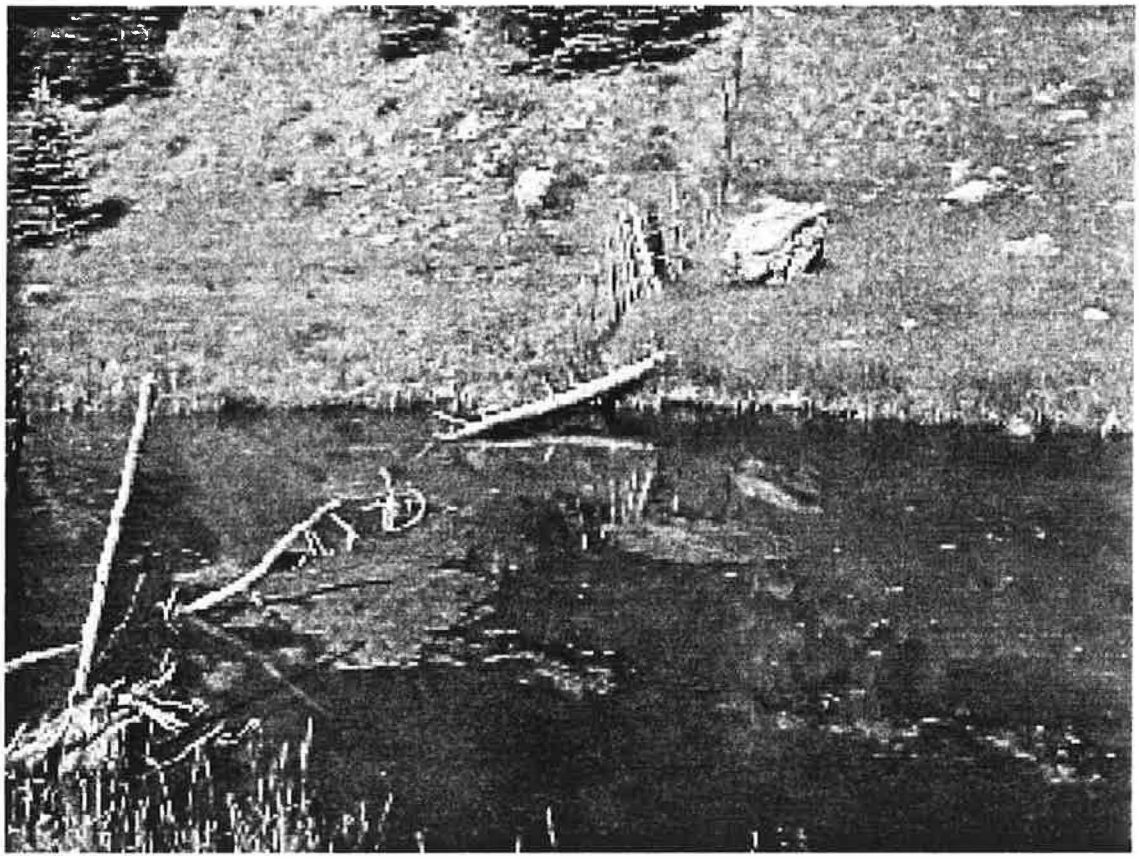
East Fork Jemez segment 8 at crossing



East Fork Segment 8 8/2/2000. (N 35 50.205' W 106 30.064' N).



East Fork Jemez reach 8 PFC above boundary fence



Reach #8 East Fork at Forest Boundary 8/2/2000 (N 35 49.655' W 106 30.574').



East Fork segment 8 at boundary

Jaramillo Creek
Major tributary to the East Fork of the Jemez

Segment 1 PFC
Start of riparian is located at a spring
35 degrees 54.145 minutes
106 degrees 33.174 minutes

This segment is perennial and in properly functioning condition. The segment also contains Alte, which is rare within the Valle.

Segment 2 FAR no apparent trend

Start of segment is located at:
35 degrees 54.322 minutes
106 degrees 32.520 minutes

This segment is perennial and functioning at risk with an improving trend. Segment is incised, insufficient bank protection, and vertical instabilities. The segment extends to the road crossing. The stream type is an E3

Segment 3 PFC

Starts of segment is located at:
35 degrees 55.574 minutes
106 degrees 31.882 minutes } not our crk!

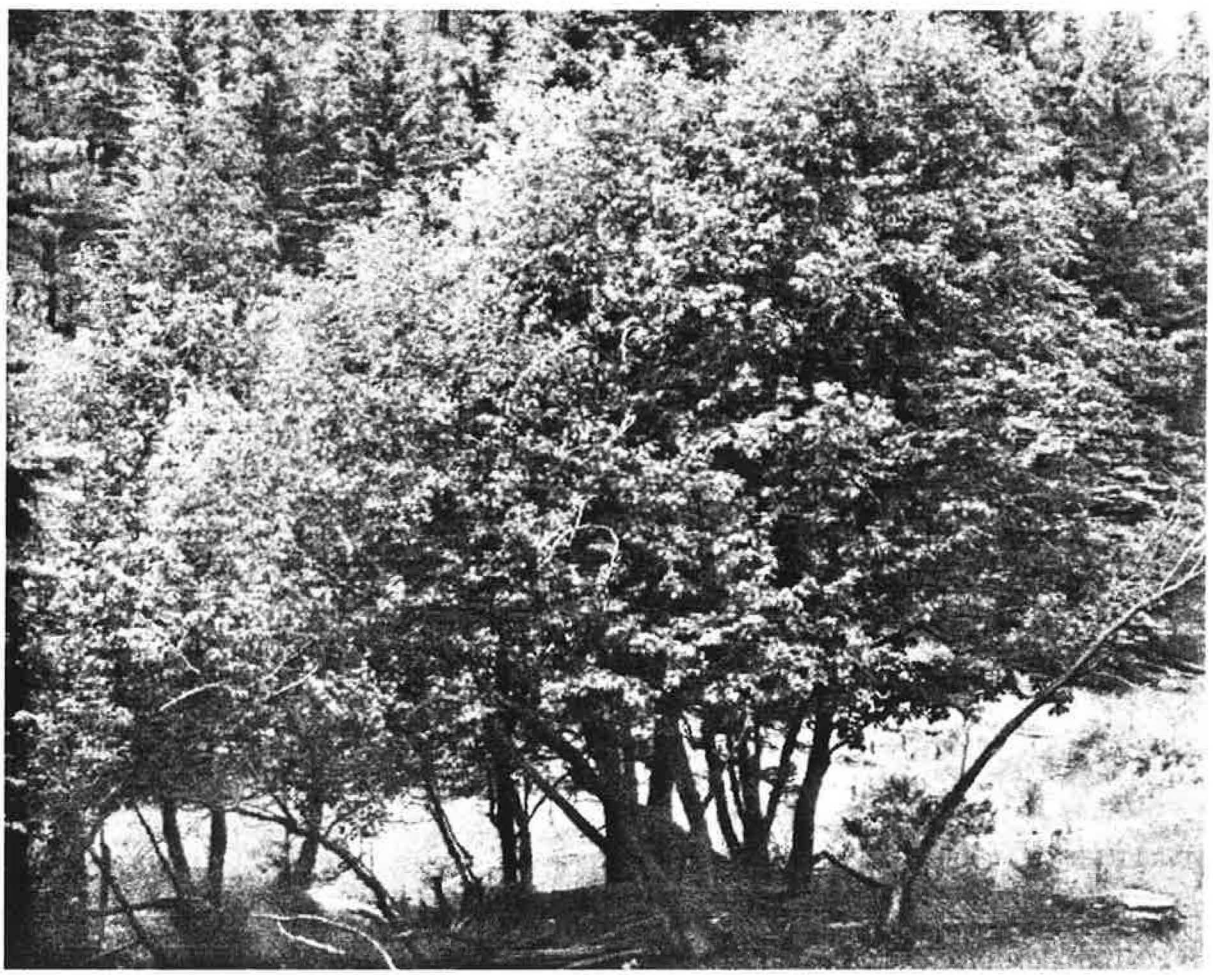
This segment is perennial and is in properly functioning condition. The reference reach where steam health (impaired) and bentics are (not impaired) were characterized (35 degrees 54.093 minutes; 106 degrees 29.110 minutes) above the major road from headquarters to San Antonio Creek. The segment extends into the Valle Grande and agricultural fields before subsurface flow joins the East Fork of the Jemez. Stream type is an E3 changing to an E4 into the Valle Grande.



Jaramillo Creek Start of Segment #1 8/4/2000. (N 35 54.145' W 106 33.174')



Jaramillo Creek 8/4/2000. Reach #1 more defined channel.



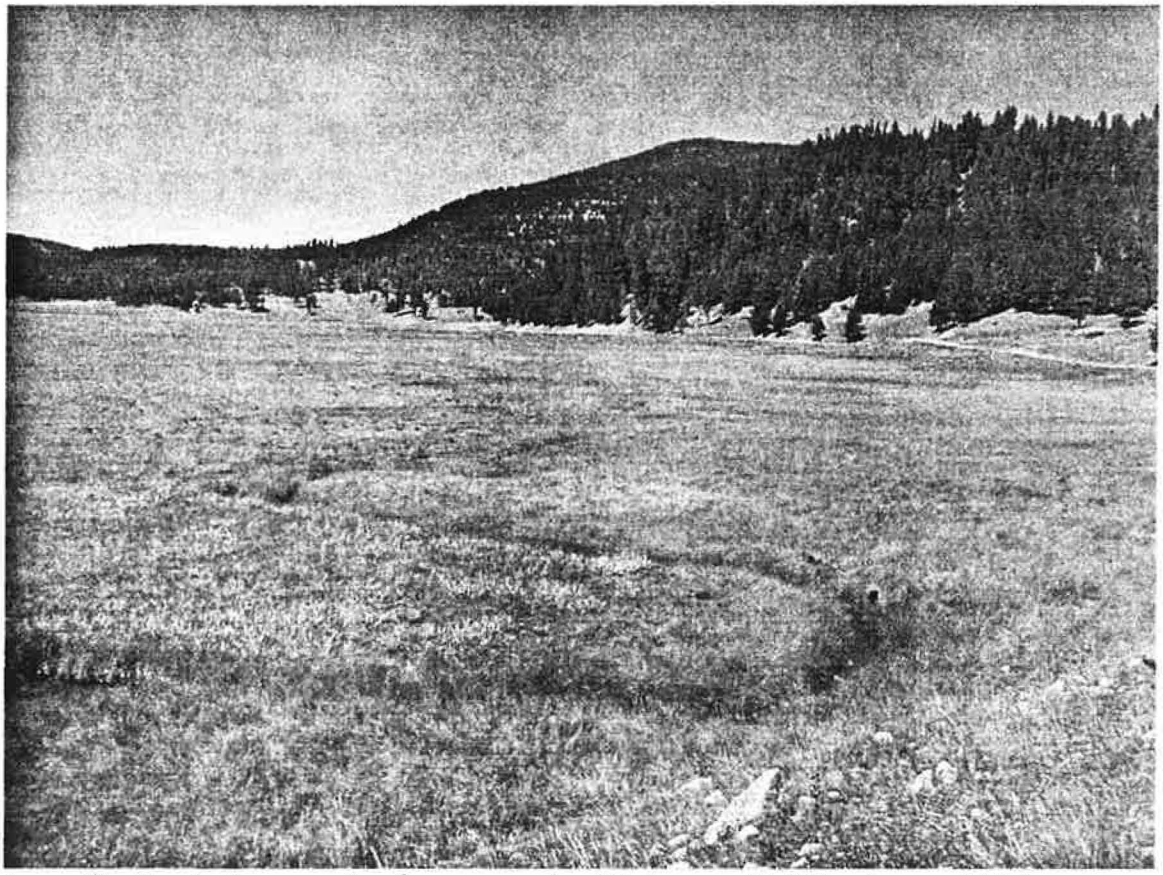
Jaramillo Creek: Segment 1, Alnus tenuifolia limited number and extent of woody specie in headwater locations in Jaramillo and Rio de los Indios.



Jaramillo Creek 8/4/2000. Reach 2 extends from 35 degrees 54.322 minutes 106 degrees 32.520 minutes to 35 degrees 55.574 minutes 106 degrees 31.882 minutes.



Jaramillo Creek 8/4/2000. Reach #3 starts at road crossing (shown above). An overview of the reach is in the background. (35 degrees 55.574 minutes 106 degrees 31.882 minutes)



Jaramillo Creek Segment 3 reference reach. (35 degrees 54.093 minutes 106 degrees 29.110 minutes)

San Antonio Creek PFC Findings

Segment 1 PFC

Start of riparian is located at
35 degrees 55.509 minutes north
106 degrees 24.560 minutes west

Indicators used to determine if riparian conditions are present include:
Vegetation: Carex rostrata & Carex aquatalus
Soil: mottles 10 YR 3/2 with matrix of 10 YR 2/1
Hydrology: evidence of water in profile and at bottom of soils pit

This intermittent segment is completely vegetated with a dominance of riparian species either obligative or facaltative wet across the channel and on either side. Some pot hole development was observed within the riparian/wetland area that provides small areas of standing water.

Segment 2 PFC

Start of reach is located at:
35 degrees 55.505 minutes north
106 degrees 25.225 minutes west

As the creek drops to the west around a basalt dome this intermittent reach has a more confined and steeper channel than reach 1 with cobble to boulder size bed material. A constructed stock tank is a hydrologic modifier along this reach and was broken as reach 2A below the dam. Similar rate were assessed both above and below the dam so the overall rating stayed the same. Some leakage along the south corner of the dam may aid down stream riparian development due to extending the hydrologic runoff response over a longer period of time.

Segment 3 Non Riparian

Start of reach is located at
35 degrees 55.802 minutes north
106 degrees 25.635 minutes west

Upland species are found across the channel.

Segment 4 PFC

Start of reach is located at:
35 degrees 56.493 minutes north
106 degrees 26.758 minutes west

This reach starts the perennial portion of the San Antonio Creek at the east end of the Valle Toledo. The reference reach is found about a mile downstream and prior to the confluence with the artisian well that supplies most of the flow in the San Antonio. A series of small drops (headcuts) are moving upstream below the reference reach that might indicate historic impacts or the influence of the well.

Segment 5 PFC

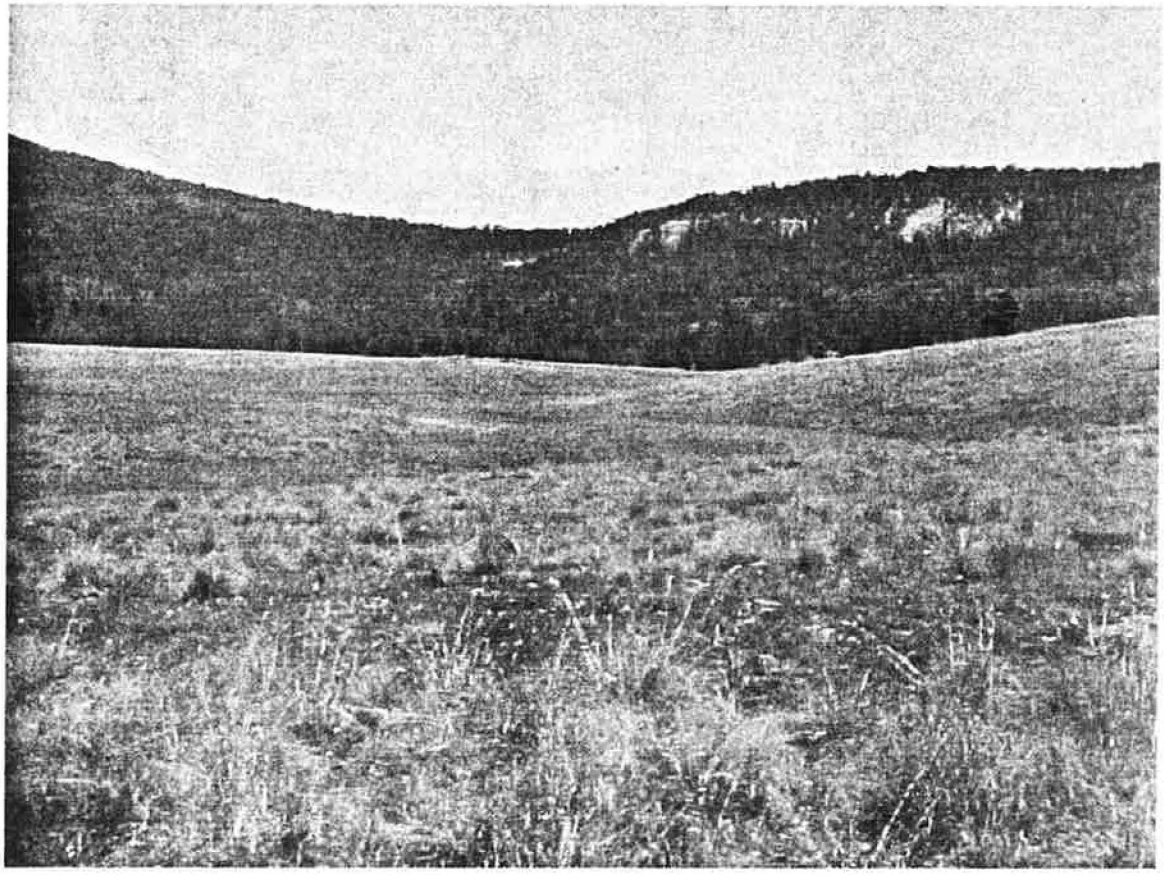
Start of reach is located at:
35 degrees 57.841 minutes north
106 degrees 29.478 minutes west

This segment starts at the confluence of Rio de los Indios and crosses the pipeline road. This segment ends at the east end of the Valle San Antonio.

Segment 6 FAR upward trend

Start of reach is located at:
35 degrees 58.093 minutes north
106 degrees 29.947 minutes west

This segment extends along the length of the Valle de San Antonio to the boundary of the VCNP. Sinuosity, width/depth ratio, lack of adequate riparian plant communities on the banks, and lateral stream movement are evidence of imbalances in the system. This is probably due to a variety of factors which includes the geothermal well drilling in the 60s and 70s that is producing the increased flows into the channel and herbivory effecting upland effective ground cover over the last 100+ years and bank stability which influences the amount of sedimentation, and water yield which may have contributed to the current conditions.



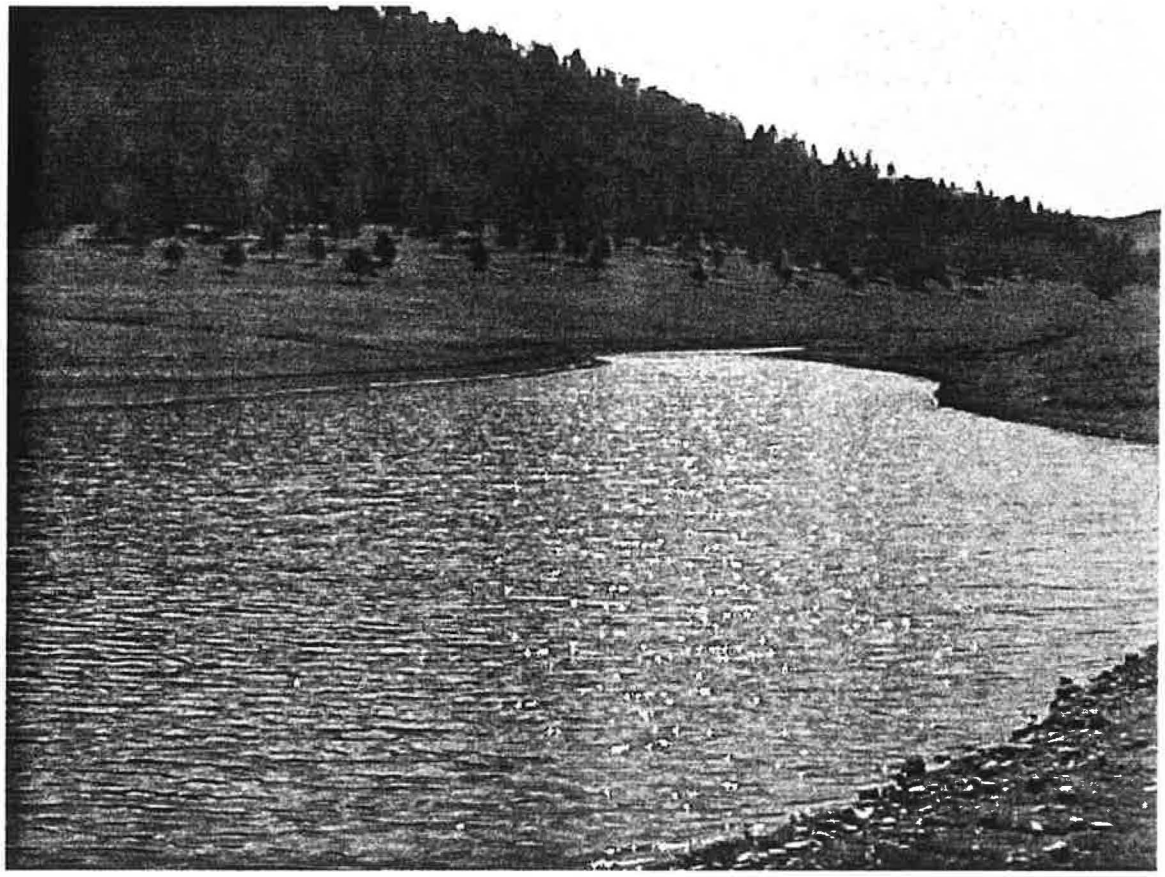
San Antonio Segment 1 8/3/2000 Overview of an intermittent segment in properly functioning condition.



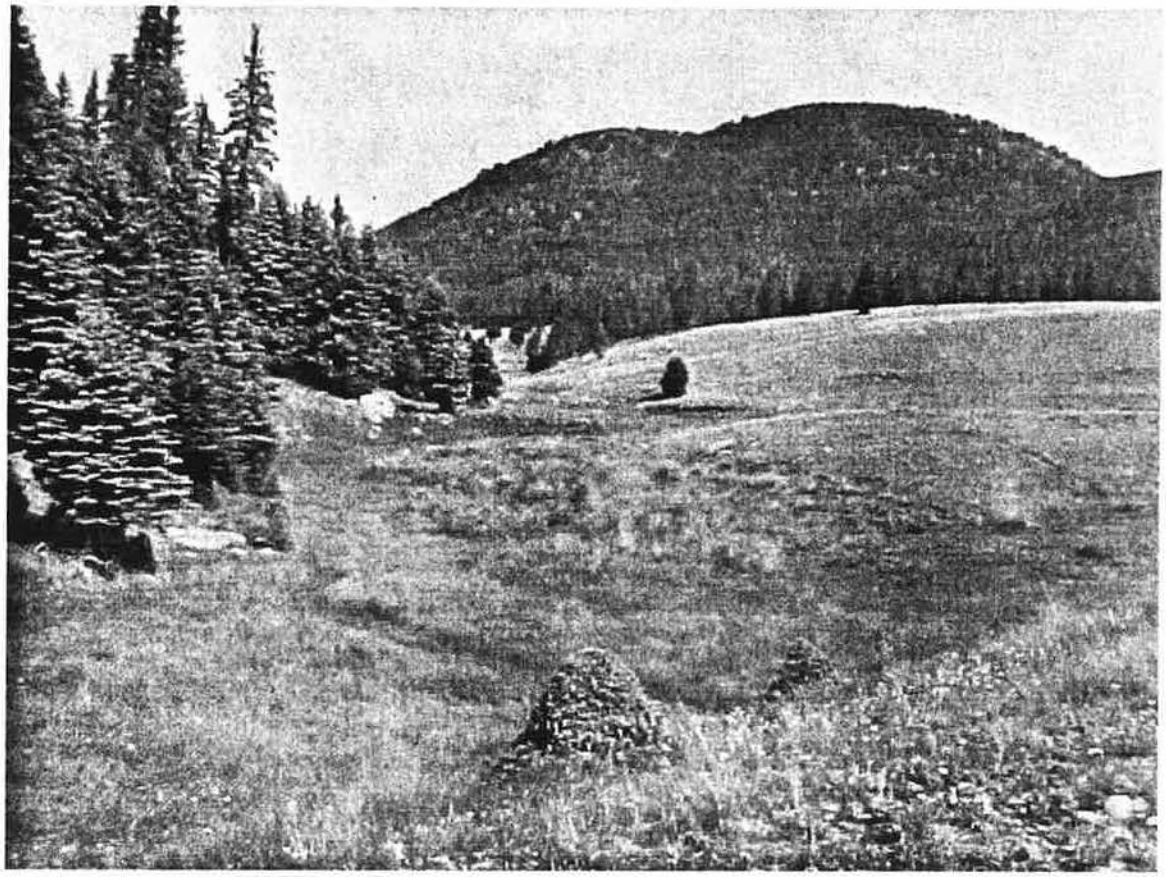
Segment 1 San Antonio Creek top of segment (pot hole creation) with riparian/wetland in Properly Functioning Condition.



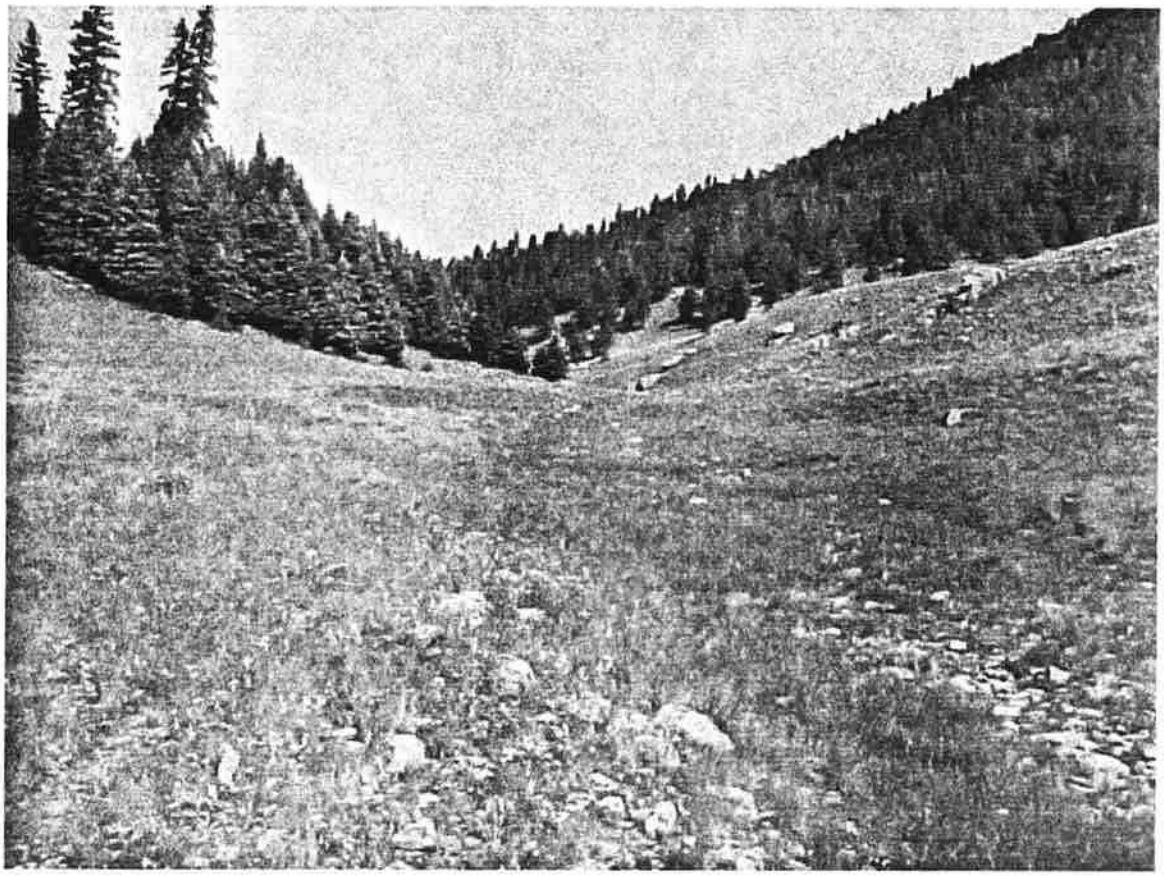
Segment 2 & 2A San Antonio Creek below dam. Channel is intermittent with influences from the stock tank just around the bend to the left. Riparian/wetland condition is Properly Functioning Condition.



Segment 2 San Antonio 8/3/2000. Hydrologic modifier.



Segment 2A San Antonio 8/3/2000. Photo taken standing on dam looking at the intermittent channel.



San Antonio Segment 2 8/3/2000 an intermittent segment in properly functioning condition.



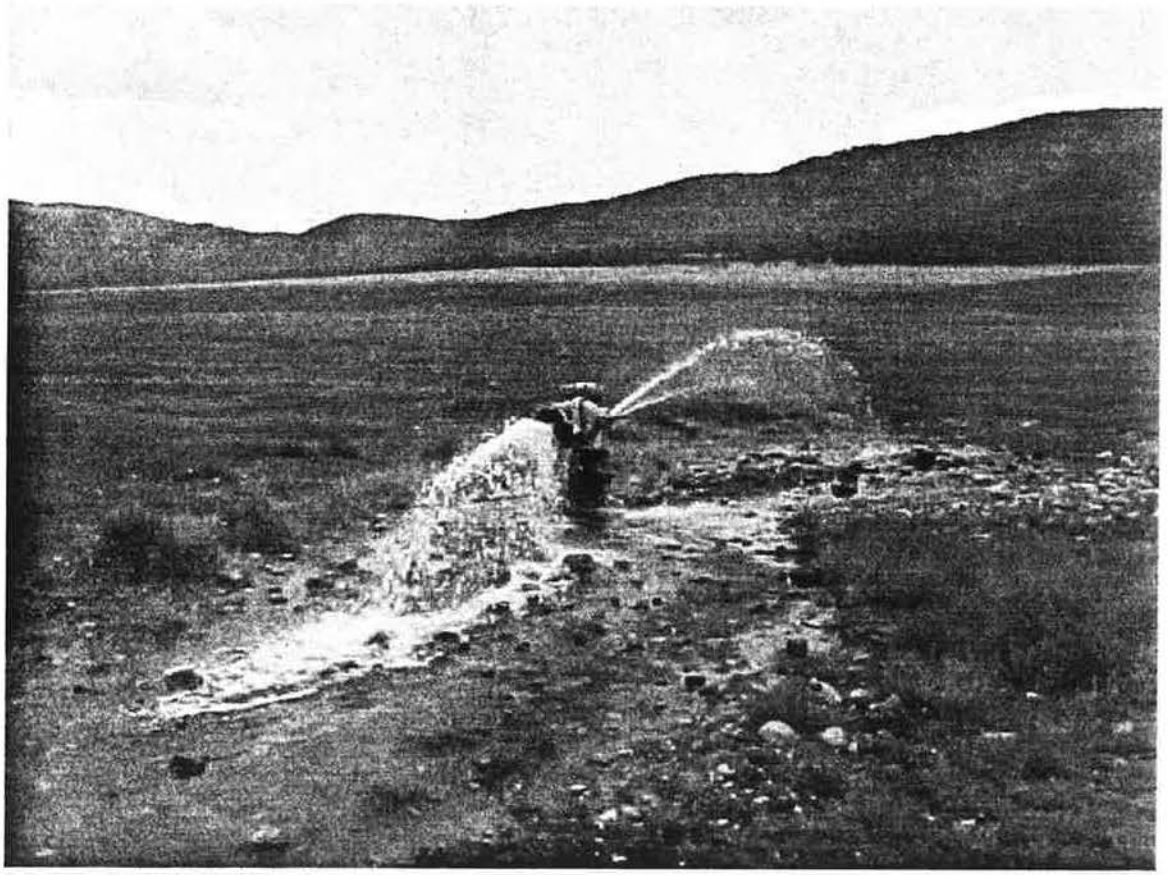
Lower end of segment 2 San Antonio Creek intermittent channel in Properly Functioning Condition lower end



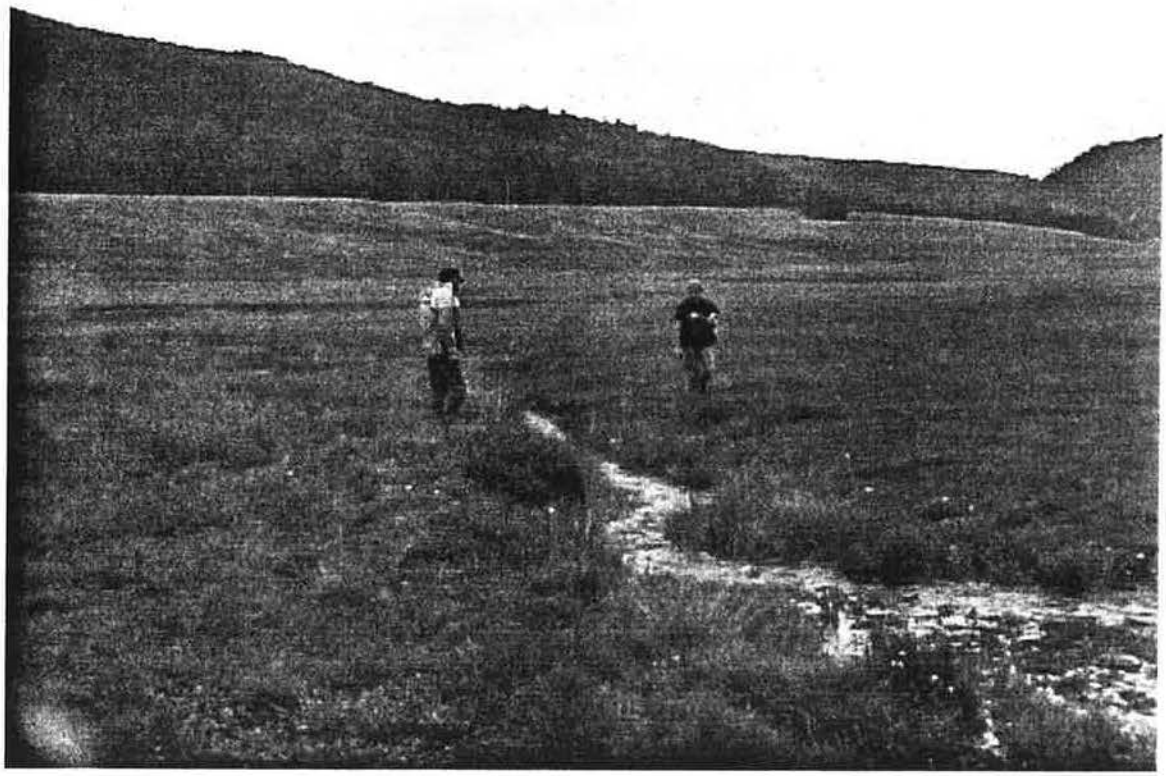
San Antonio Segment 3 non-riparian.



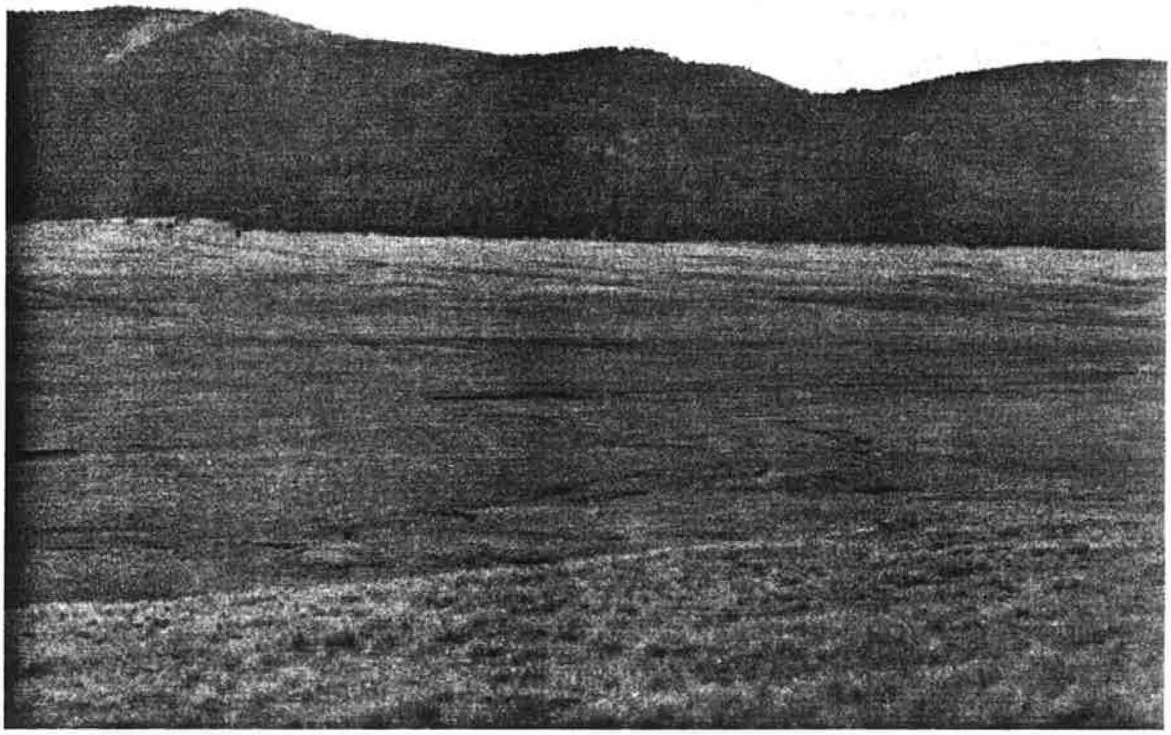
San Antonio Segment 4 8/3/2000 Start of perennial water.



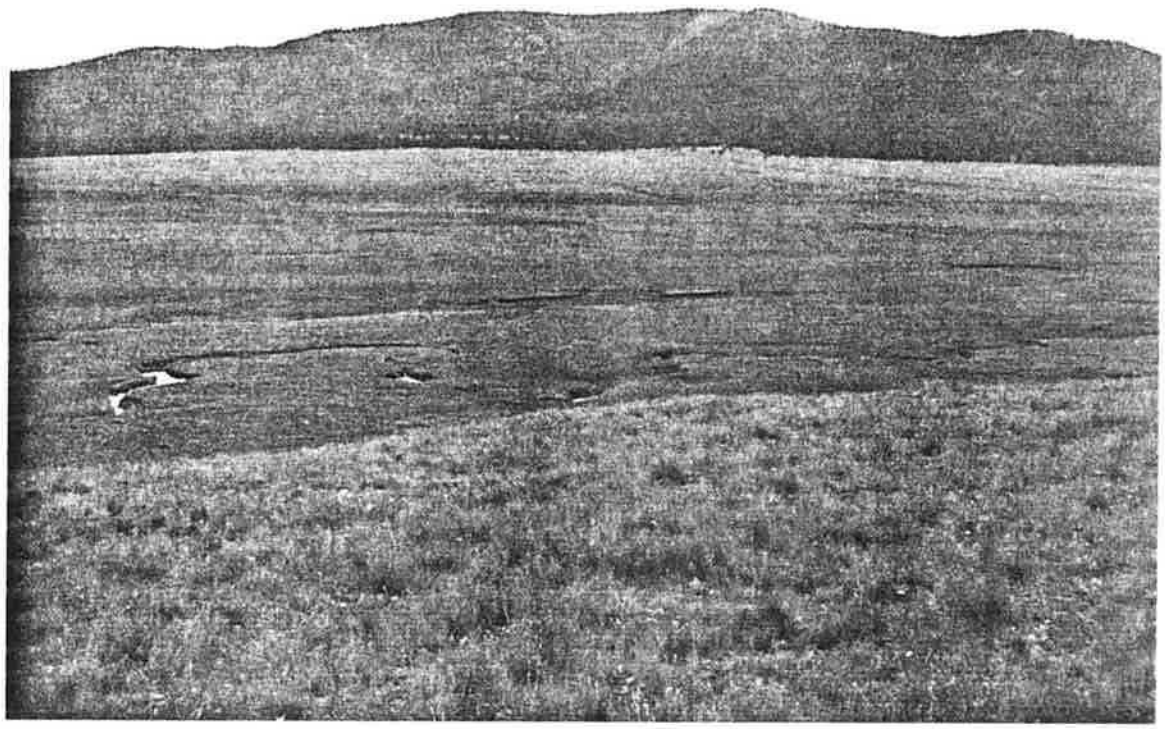
San Antonio Segment 4 8/3/2000. Artesian well major source for San Antonio Creek flow.



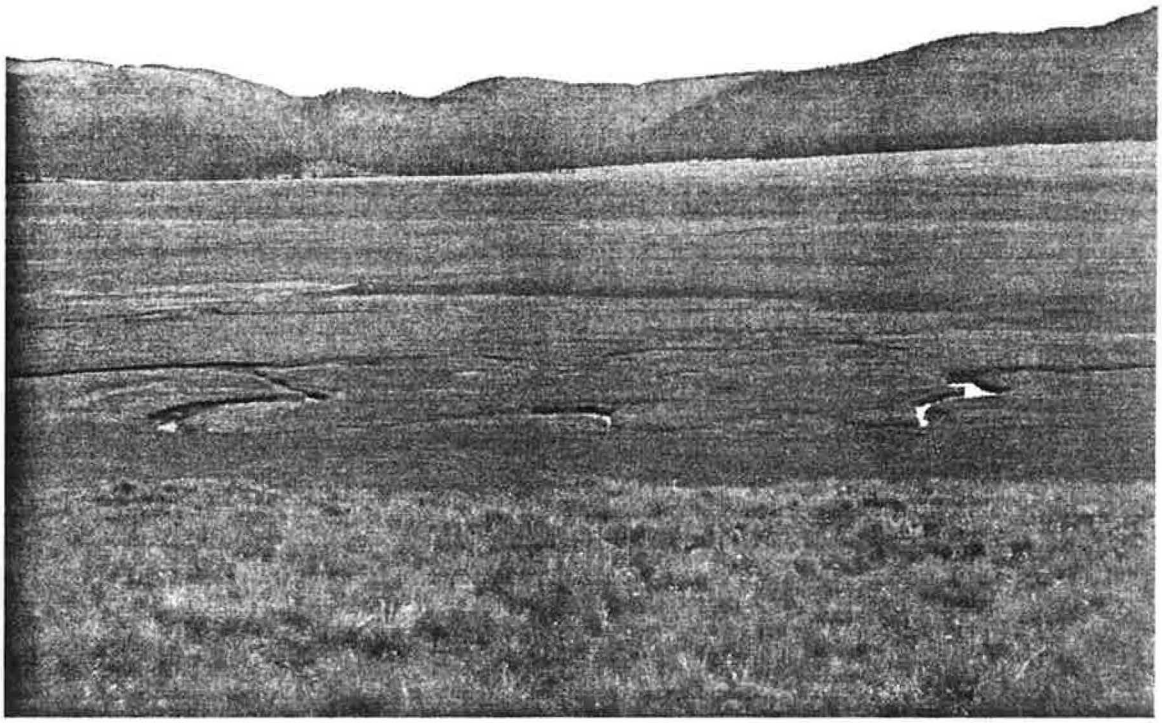
Segment 4 San Antonio 8/3/2000 tributary originating at artesian well.



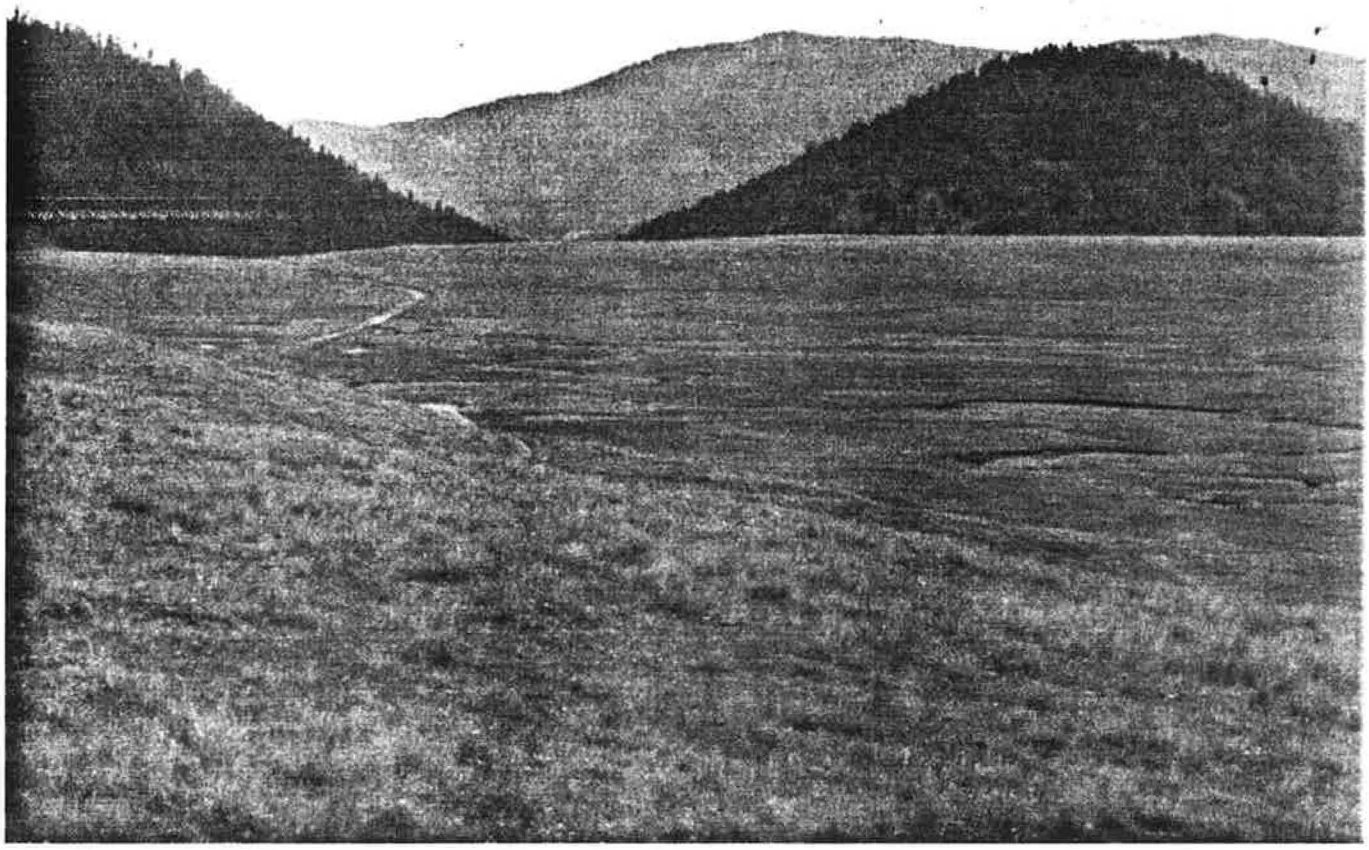
Segment 4 San Antonio Creek north east over view of properly functioning condition of a Rosgen E4 system Reference reach



Segment 4 San Antonio Creek across the Valle Toledo Properly Functioning Condition

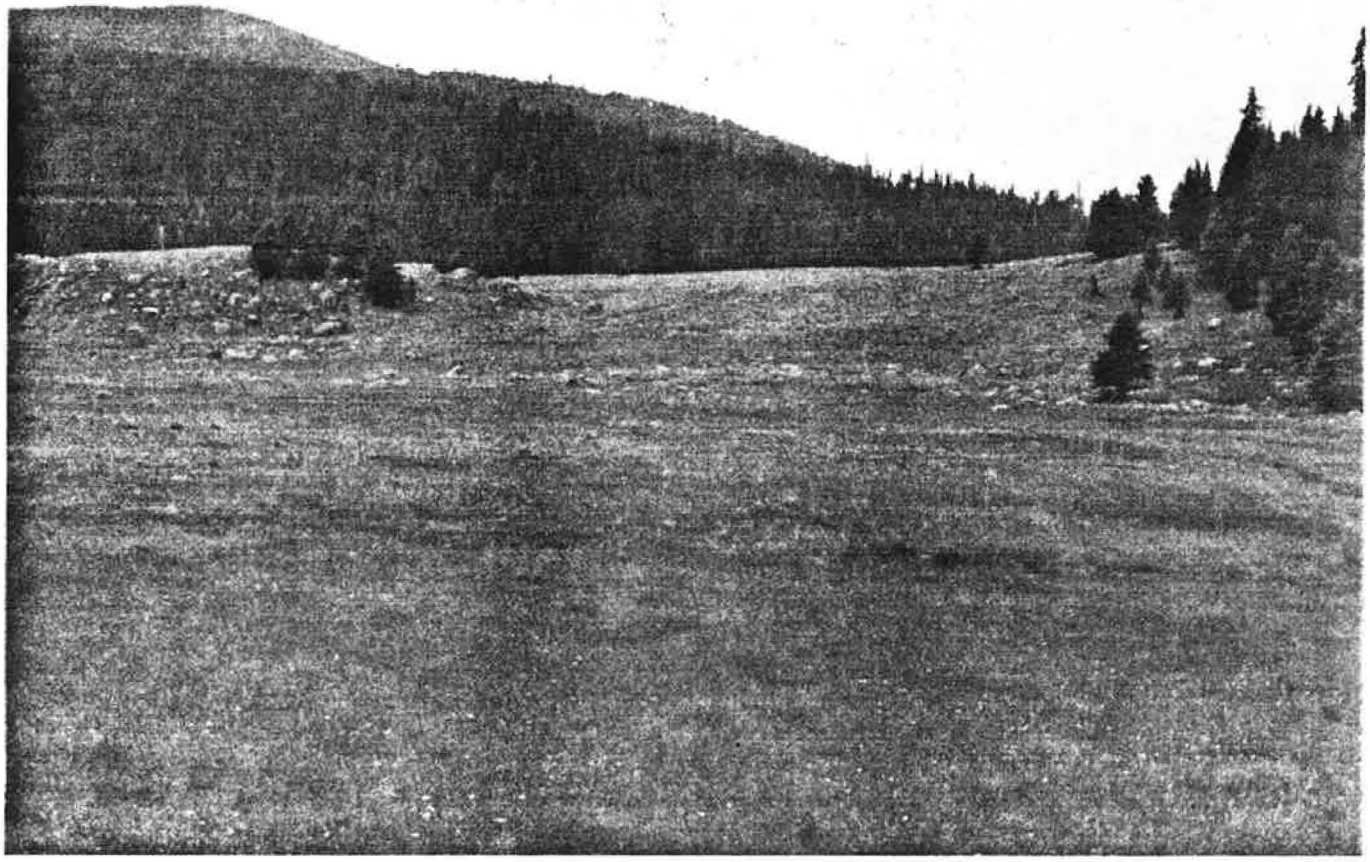


Segment 4 San Antonio Creek across the Valle Toledo. Rosgen E4 in properly Functioning condition. Some indication of unstable banks developing.

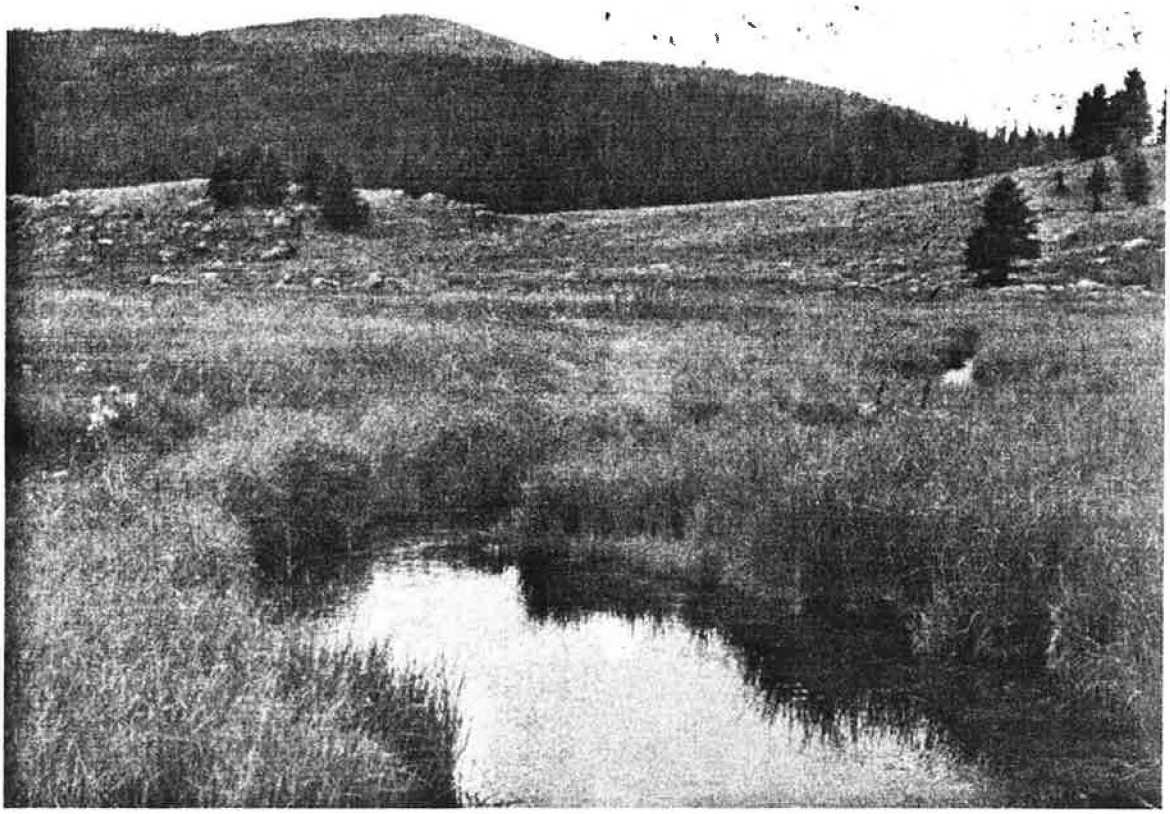


Segment 4 San Antonio Creek north west over view Rosgen E4 in Properly Functioning Condition

West end of Valle Toledo looking toward Rio de los Indios



San Antonio Creek Segment 4 PFC looking toward swale photo point.

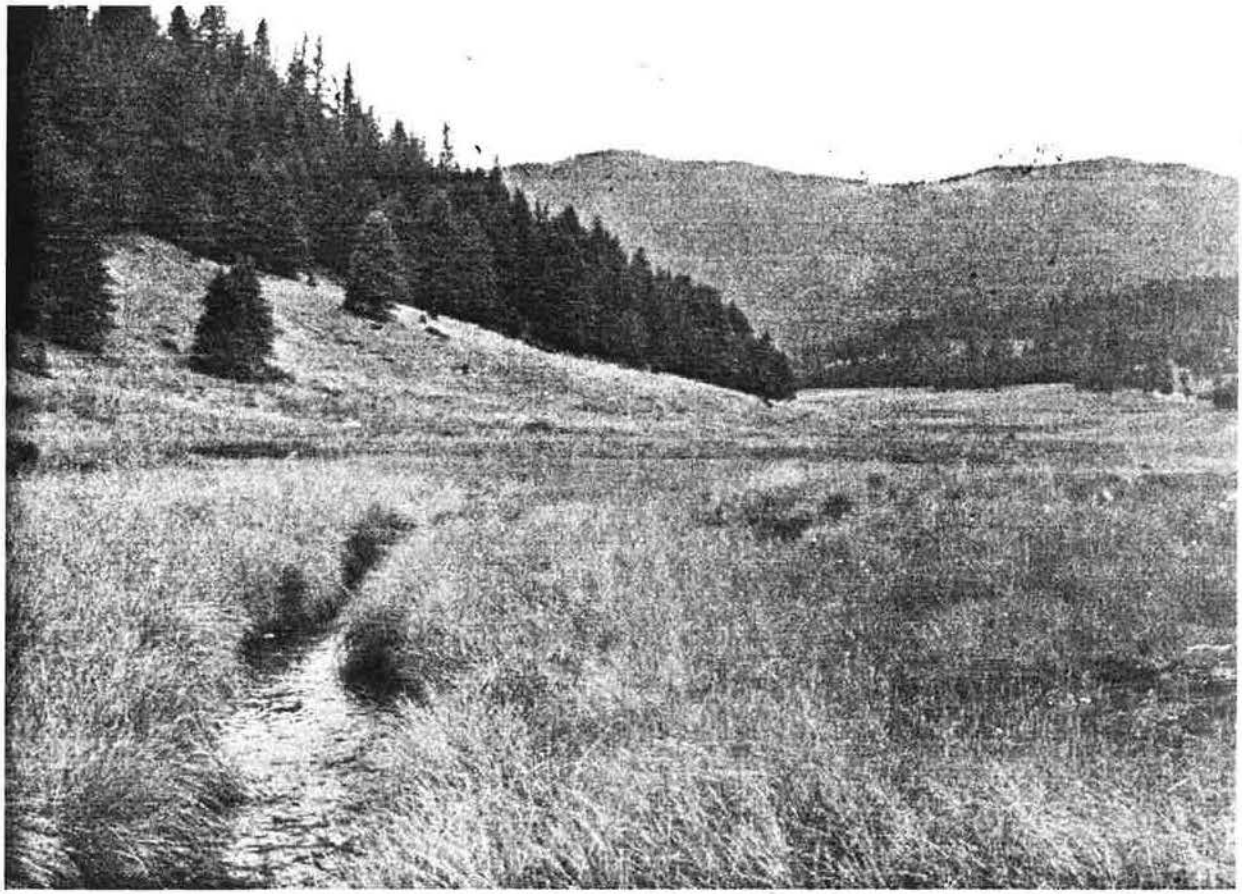


Segment 4 San Antonio Creek above confluence with Rito de los Indios. Rosgen E4 in properly functioning condition.

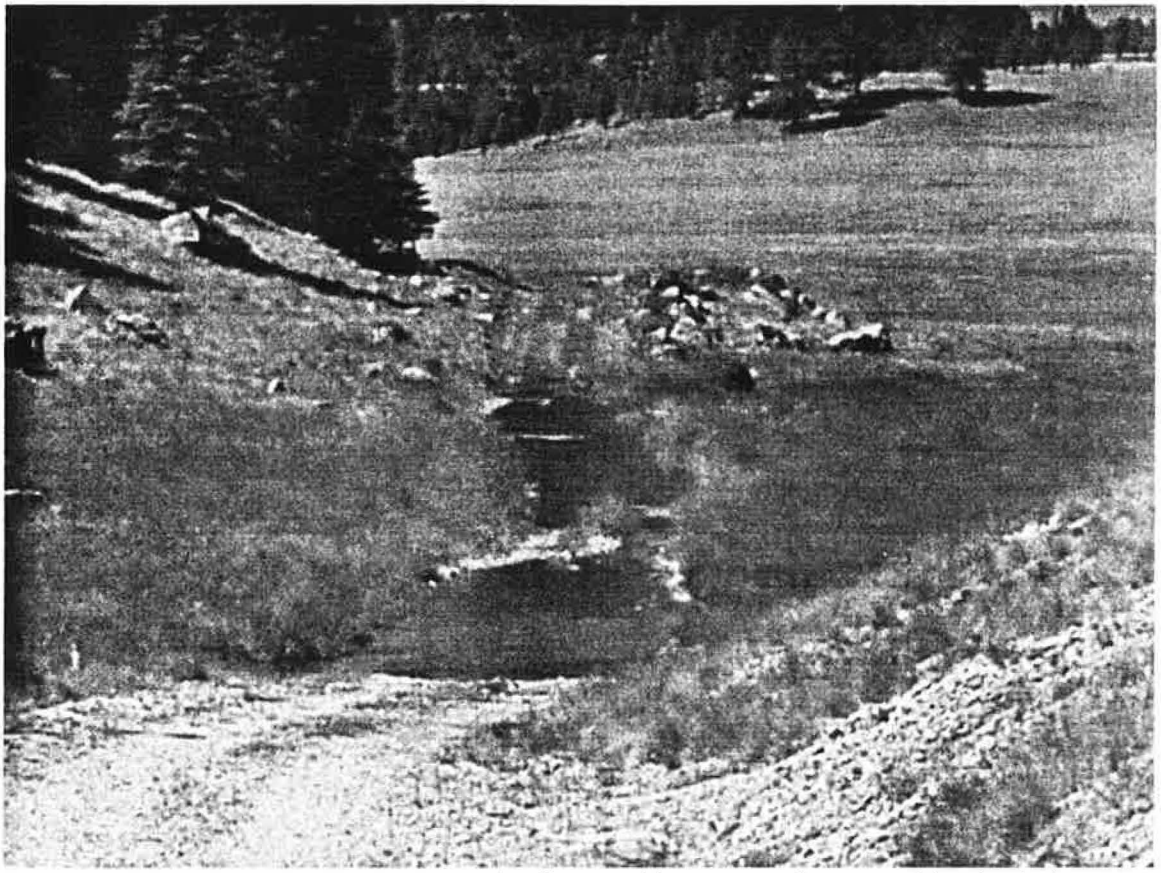
Looking toward swale photo point



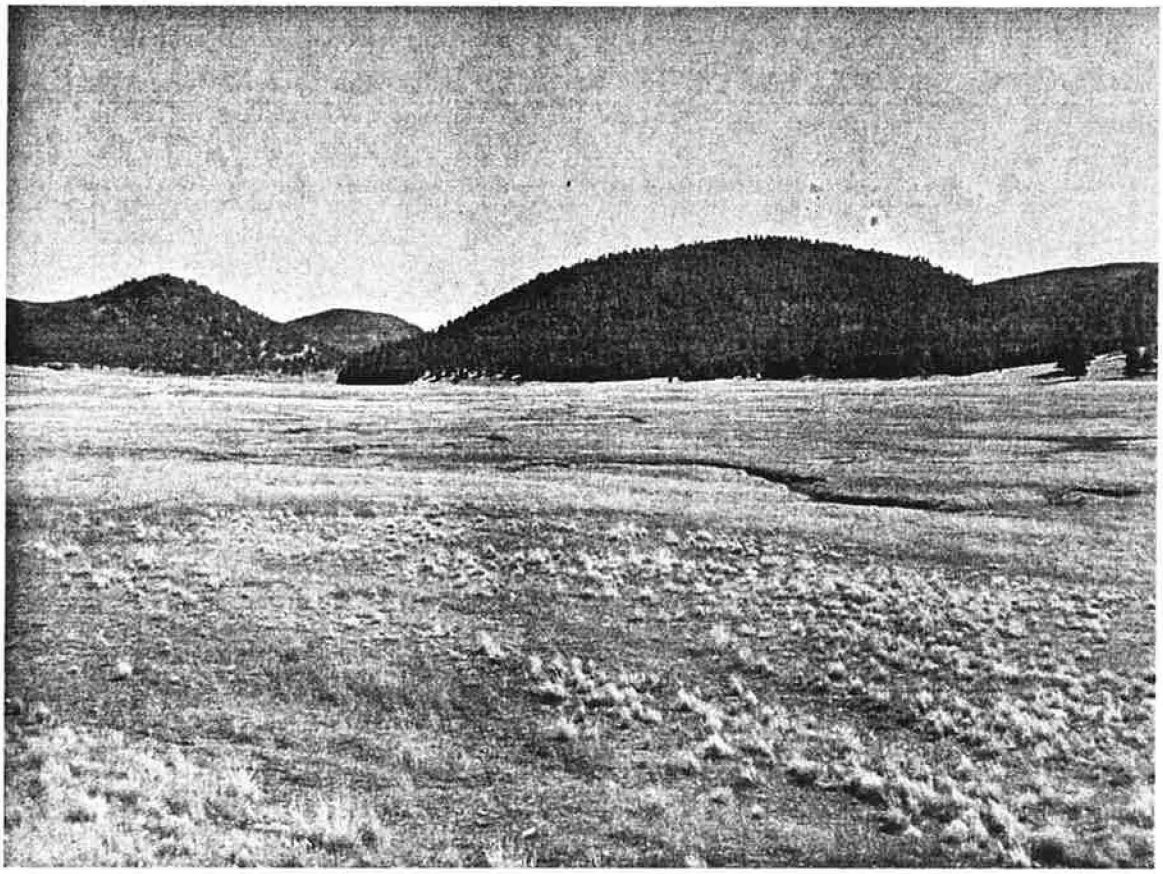
Segment 4 San Antonio Creek at the confluence with Rio de los Indios Rosgen E4 channel in Properly Functioning Condition.



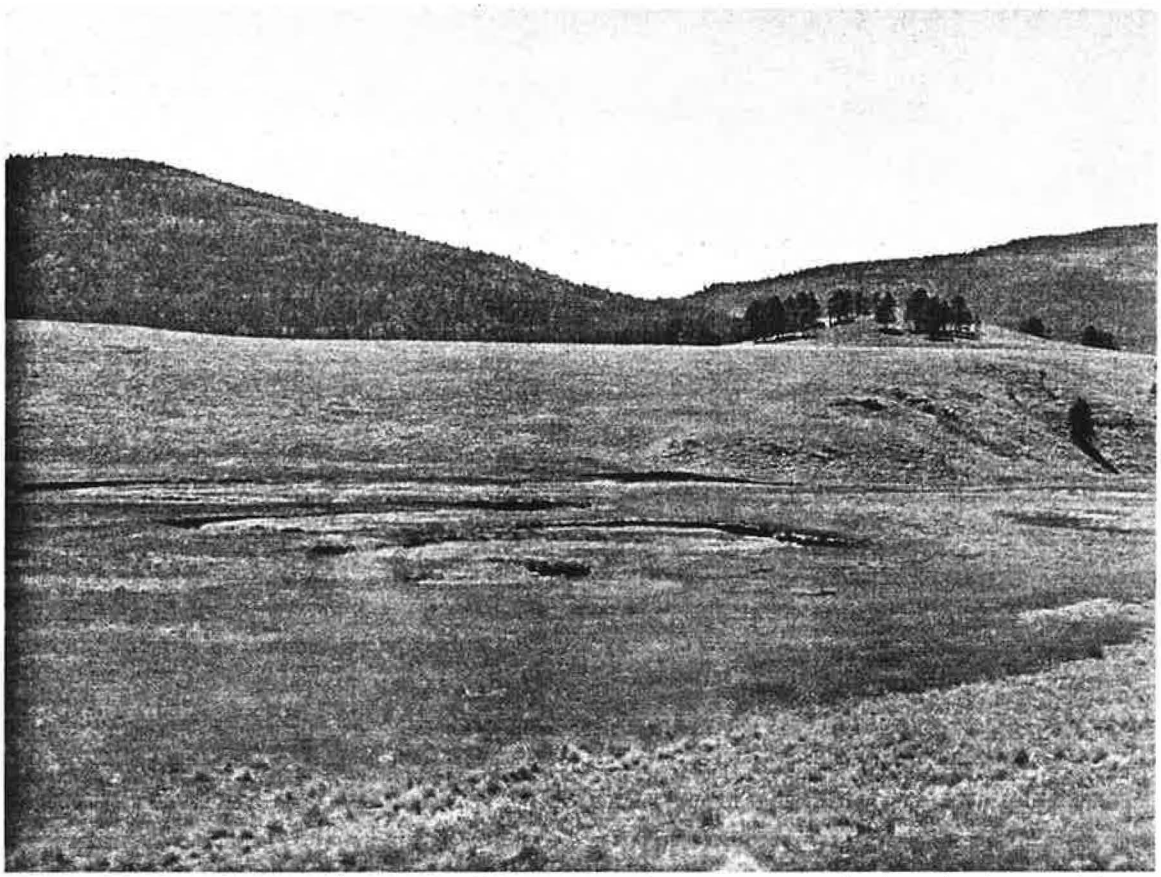
San Antonio Segment 5 PFC Below confluence with Rio de los Indios. Rosgen E3



Segment 5 San Antonio Creek along pipeline road below confluence with Rio de los Indios



Segment 6 foreground Segment 5 background of San Antonio Creek within the Valle San Antonio overview of a portion of segment 6 Functioning at Risk and segment 5 properly functioning condition. Rosgen E4 with some increased entrenchment
Near San Luis Creek



Segment 6 San Antonio Creek in Valle San Antonio. Rosgen E4 in functioning at risk upward trend. Bank instability on the outside of the meanders. Riparian/wetland vegetation in isolated patches. Upland vegetation dominant bank community.



Segment 6 San Antonio 8/3/2000. N 35 58.093' W 106 29.947' Is a low gradient reach just prior to leaving the VCNP. This reach is an E5 that is functioning at risk upward trend.



Segment 6 San Antonio (8/3/2000) extended to Forest boundary.

Rito de los Indios

Segment 1 PFC

Start of riparian is located at
36 degrees 0.066 minutes north
106 degrees 27.983 minutes west

Indicators used to determine is riparian conditions are present include:
Vegetation: Carex rustrata & Carex aquatalus
Soils: Mottles 10 YR 3/2 with matrix 10 YR 2/1
Hydrology: evidence of water in profile

This initial intermittent reach rapidly changes through many small seeps into a constricted low flow channel by the travelway. Old mill site with cabins and roads are found in the valley. Remnant Alob are scattered along this segment.

Segment 2 FAR no apparent trend

Start of reach is located at:
35 degrees 59.639 minutes north
106 degrees 28.401 minutes west

Segment starts at the base of a tallus slope with many seeps and continues past tributary fron the west. Many abandon beaver dams are destabilizing the channel with many head cuts associated with the old structures and restricting channel movement and sinuosity. Log bridges and travelways impacting channel.

Segment 3 FAR no apparent trend

Starts of reach is located at:
35 degrees 58.678 minutes north
106 degrees 28.547 minutes west

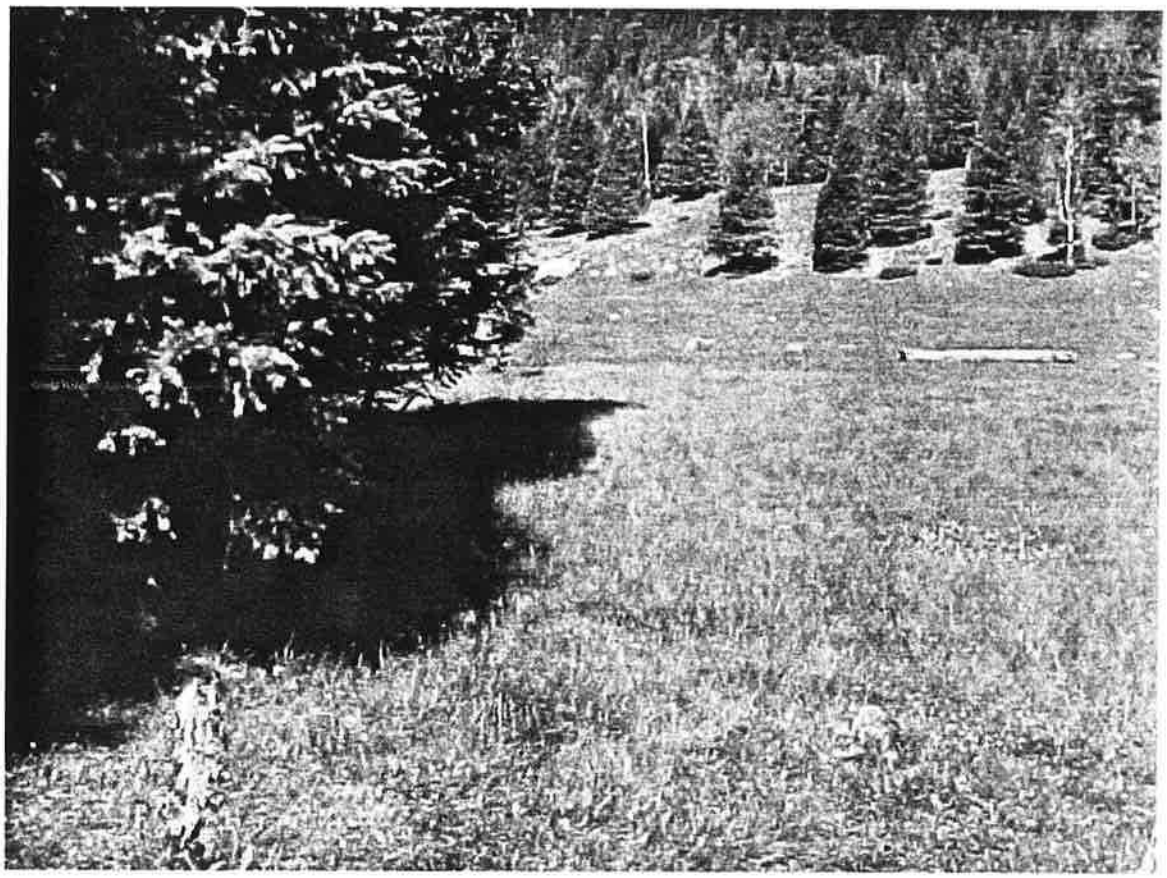
Channel conditions effected by old mounds and the travel network constricts channel

Segment 4 PFC

Start of reach is located at:
35 degrees 57.323 minutes north
106 degrees 28.779 minutes west

not on creek

Reach extends to confluence with San Antonio Creek and contains the reference reach. Breached stock tank along reach may influence sinuosity but system is stable and adjusted to landform.



Start of perennial reach of Rito de los Indios segment #1 8/22/2000. Riparian condition PFC.



Segment 1 along Rito de los Indios 8/22/2000. Travelway confining channel and restricting riparian corridor. Stream type Rosgen E3 in properly functioning condition.



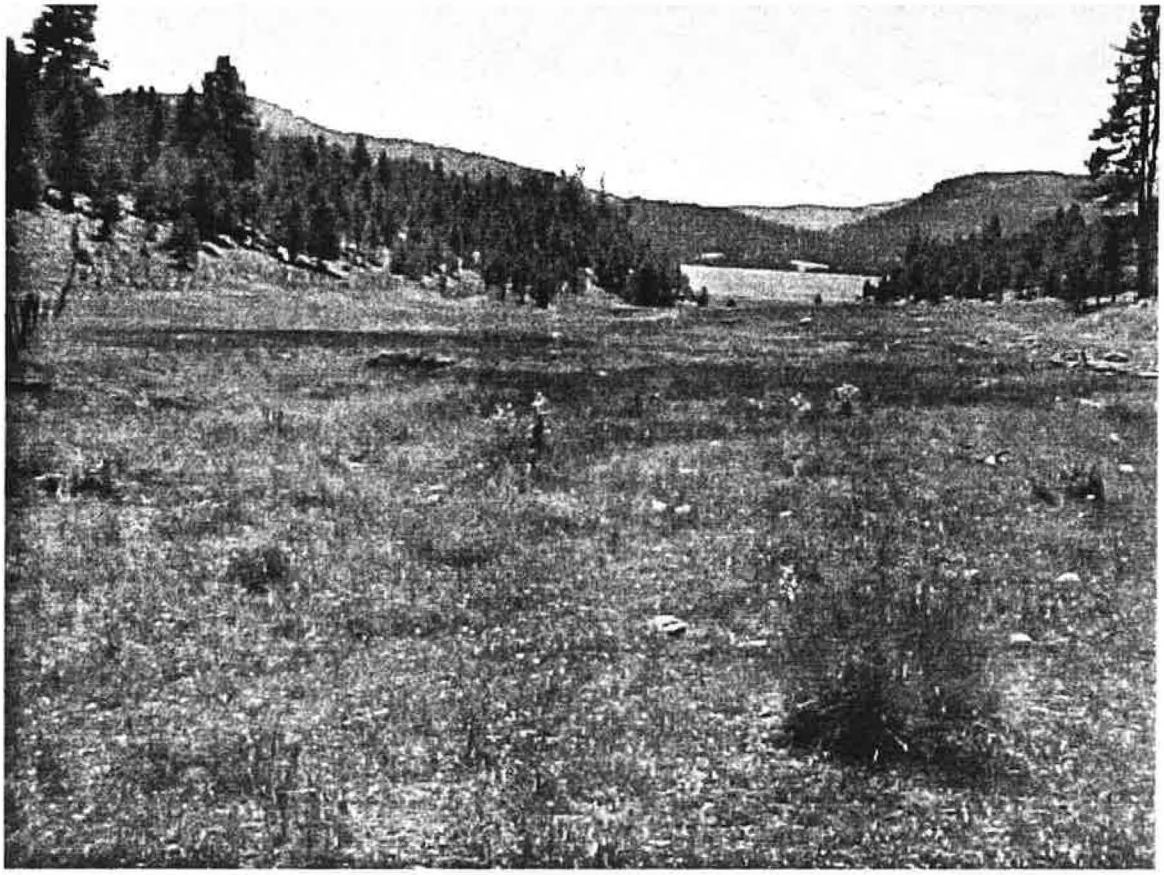
Segment 1 along Rito de los Indios near cabin 8/22/2000. Travelway confining channel and restricting riparian. Rosgen E3 in properly functioning condition.



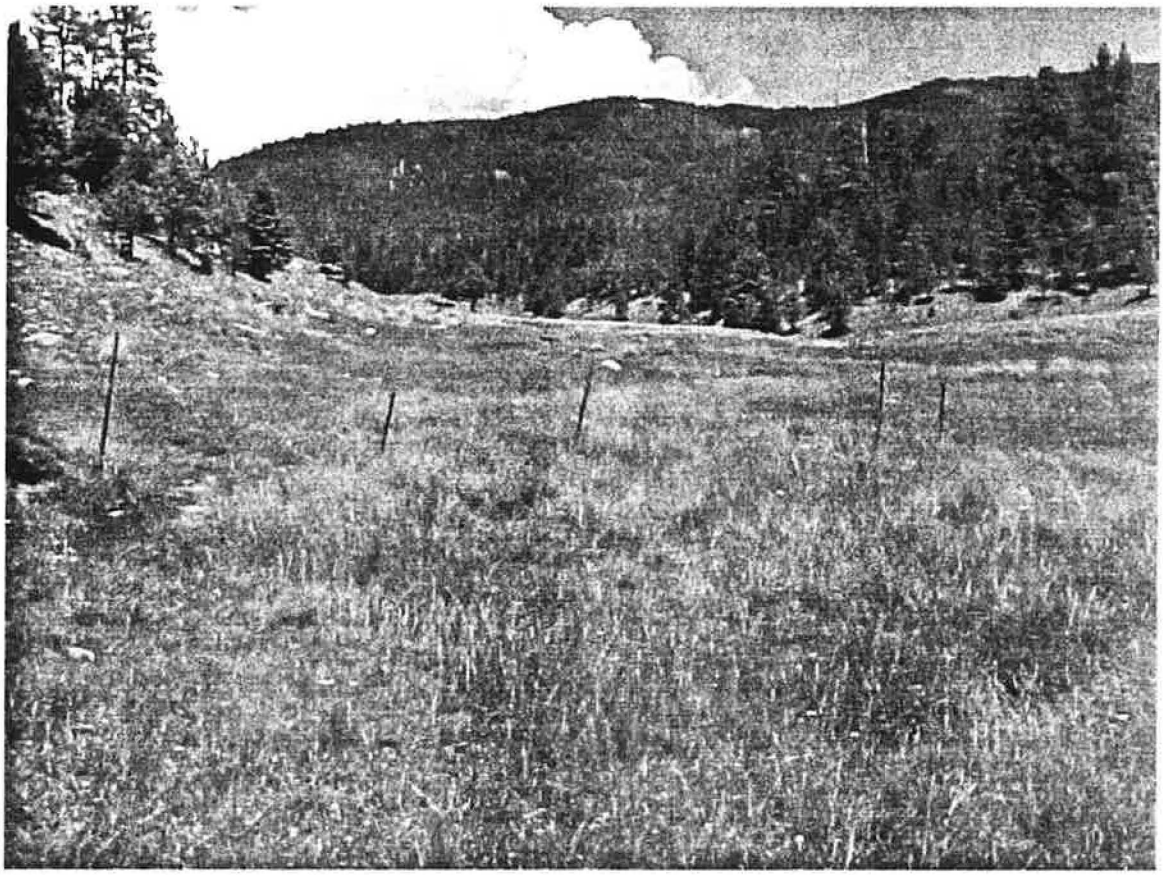
Segment 2 along Rito de los Indios major spring feeding into stream 8/22/2000.



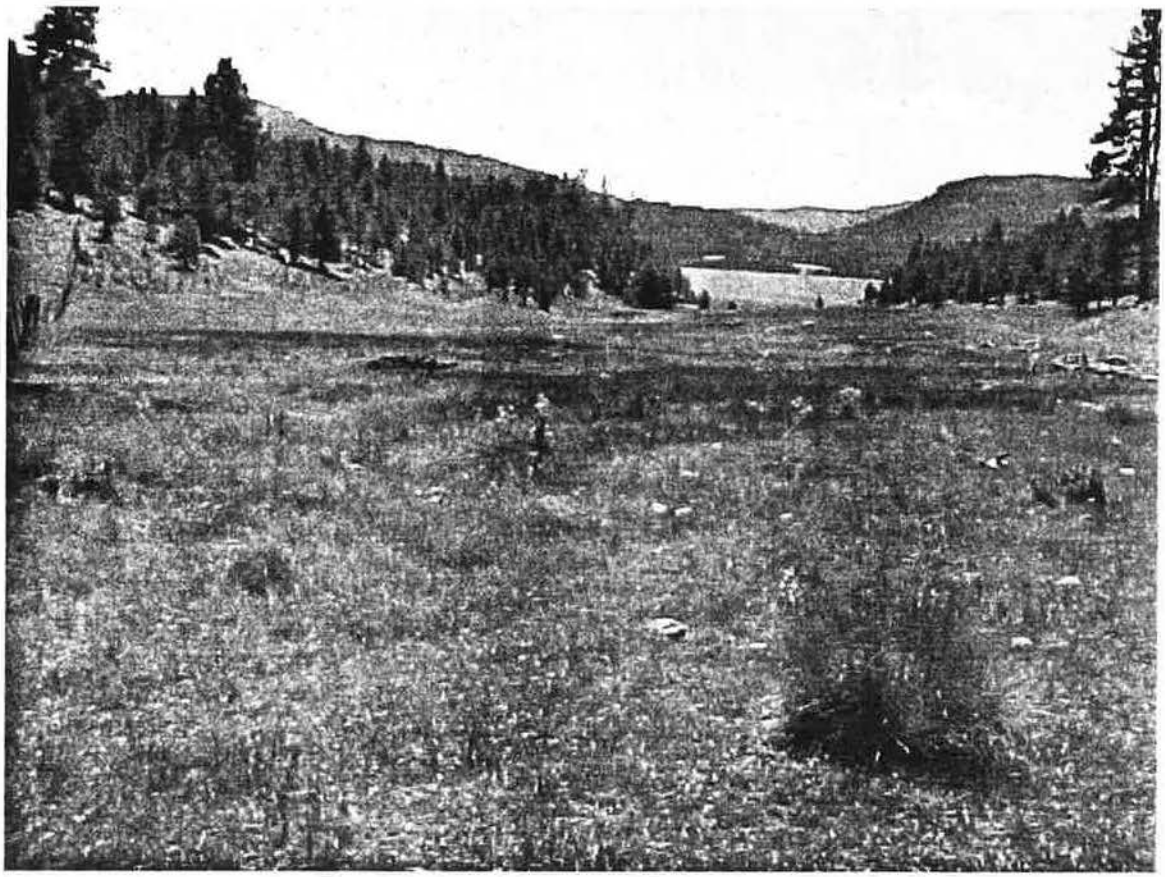
Segment 3 Rito de los Indios 8/22/2000. Broad valley bottom.



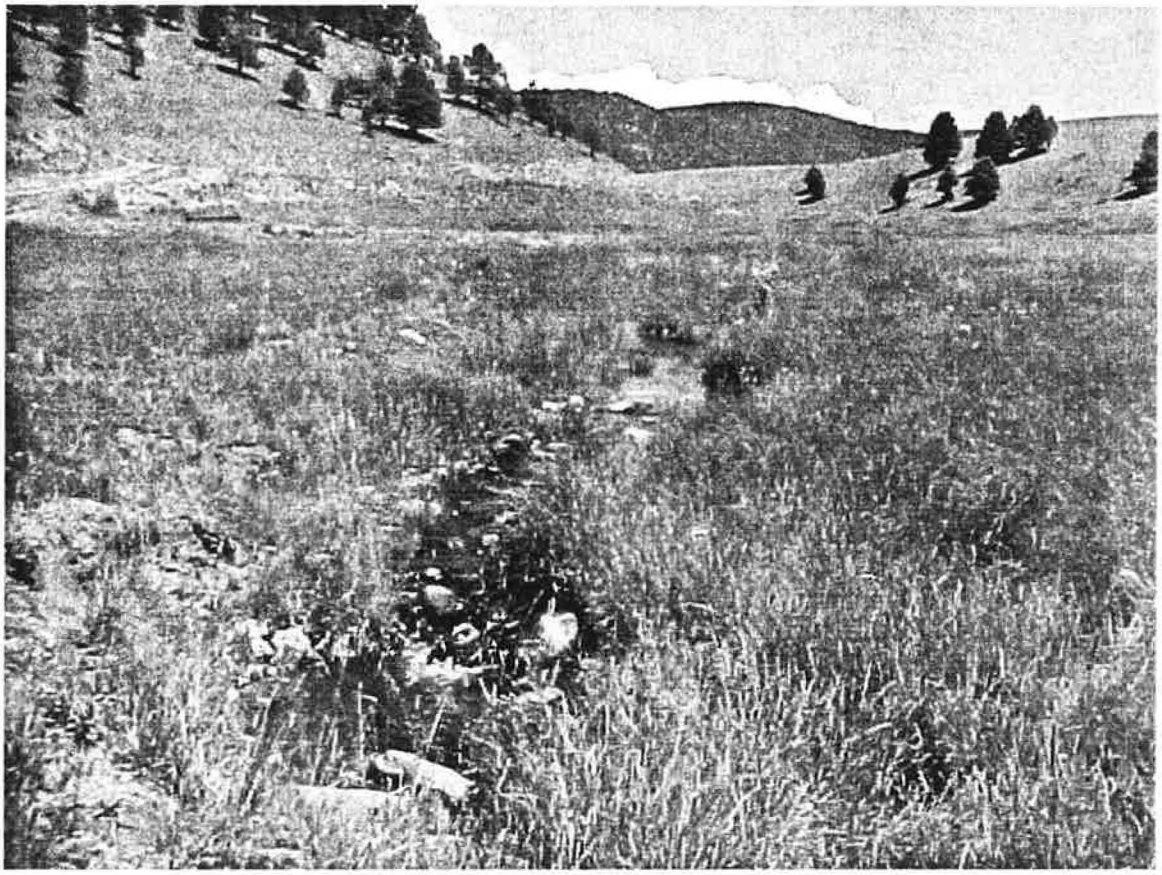
Segment 3 Rito de los Indios 8/22/2000. Riparian vegetation below fenceline (N 35 58.678' W 106 28.574').



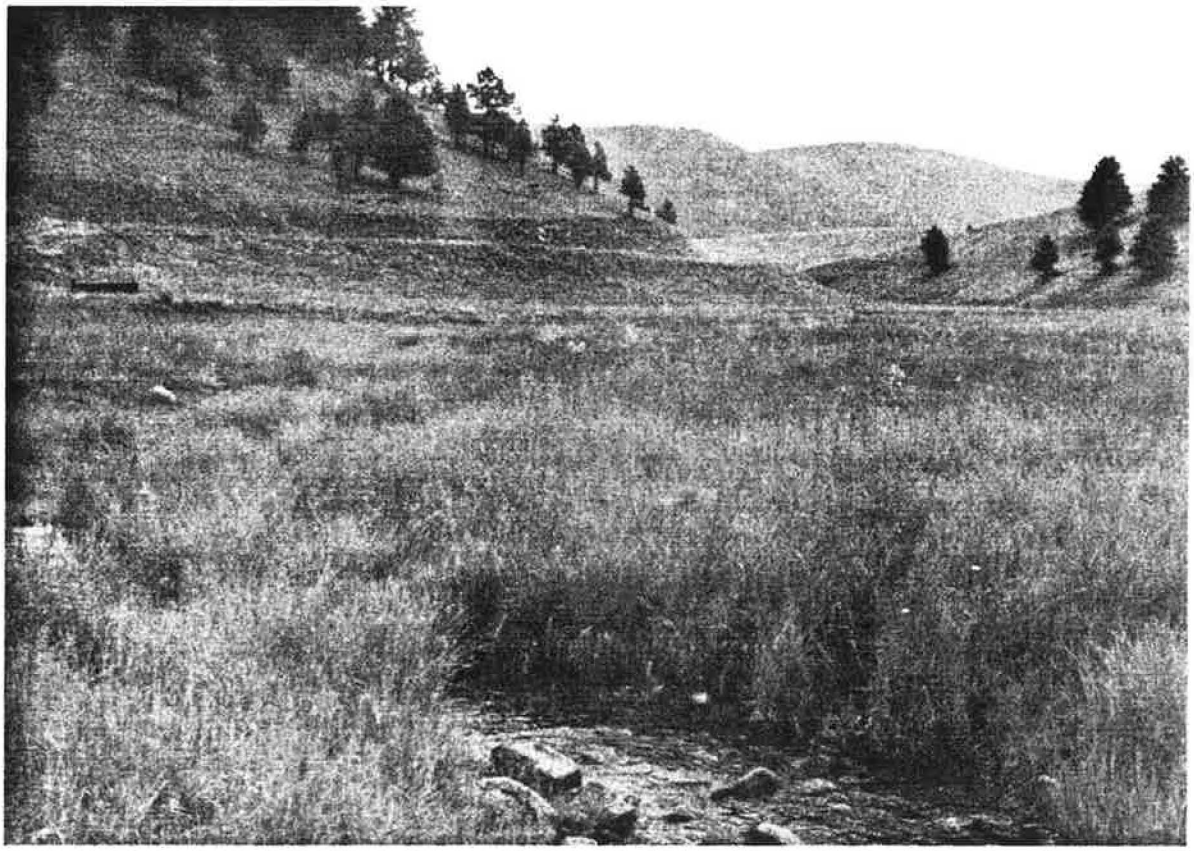
Segment 3 Rito de los Indios 8/22/2000. Mounds in the back ground constrained stream movement. Rosgen E3 Functioning at risk with no apparent trend. Limited riparian vegetation holding stream bank.



Rio de los Indios start of segment 3 functioning at risk no apparent trend looking down stream



Segment 4 Rito de los Indios above confluence with San Antonio 8/22/2000. This photo shows the reference reach for this stream. A Rosgen E3 stream in Properly functioning condition impaired by sediments from its potential and bentic population indicators not impaired.



Segment 4 Rio de los Indios PFC above confluence. Rosgen E3 in properly functioning condition. Reference reach

VALLES CALDERA NATIONAL PRESERVE

T-WALK ASSESSMENT

Conducted Fall 2000

Field Work by:

Steve McWilliams
Chic Spann

Compilation by:

Steve McWilliams

T-WALK SUMMARY

East Fork

T-WALK's Tarzwell substrate ratio was used to characterize the reference reach and was assessed as robust and near potential. A major reason for the rating was the quantity of non-emergent aquatic plant growth at 93 percent of the 100 sampling sites along 700 feet of stream reach. The Thalwag depth profile for the reference reach indicates the stream is functioning as a continuous pool. There were no evidence of dissolved oxygen problems, metals, poisons, salts, or shifts in equilibrium states at the reference reach. Temperature increases from the headwater spring through reach 4, were nearly stable through the reach but increased in reach 6 to 23 degrees C. This was attributed to shading and decreased width/depth ratio found along this reach.

San Antonio Creek

T-Walk's Tarzwell substrate ratio was used to characterize the reference reach and was assessed as precarious due to the amount of fine sediments and lack of non-emergent vegetation. A major reason for the rating was the amount of silt and fine sand sediments in the streambed and lack of vegetation. The Thalwag depth profile for the reference reach indicates the stream has a mix of pools (9%) and riffles. Sediments covered organic material and resulted in the anaerobic decomposition releasing a combination of gases such as methane, carbon dioxide, and hydrogen sulfide. The area might develop a histosol bog over part of the landscape but sedimentation and down cutting of the channel may limit development. Temperature in August was above 20 degrees C. Pools cover 9 percent of the reference reach. Stream bank vegetation is a grass/forb type.

Jaramillo Creek

T-WALK's Tarzwell substrate ratio was used to characterize the reference reach and was assessed as impaired. A factor in the determination is the amount of fine sediments. The Thalwag depth profile shows a general riffle dominated segment very similar to the reference reach on Rito de los Indios to the north (shallow pools 12%). Reduced extent of non-emergent vegetation was noted as compared to the East Fork.

Rio de los Indios

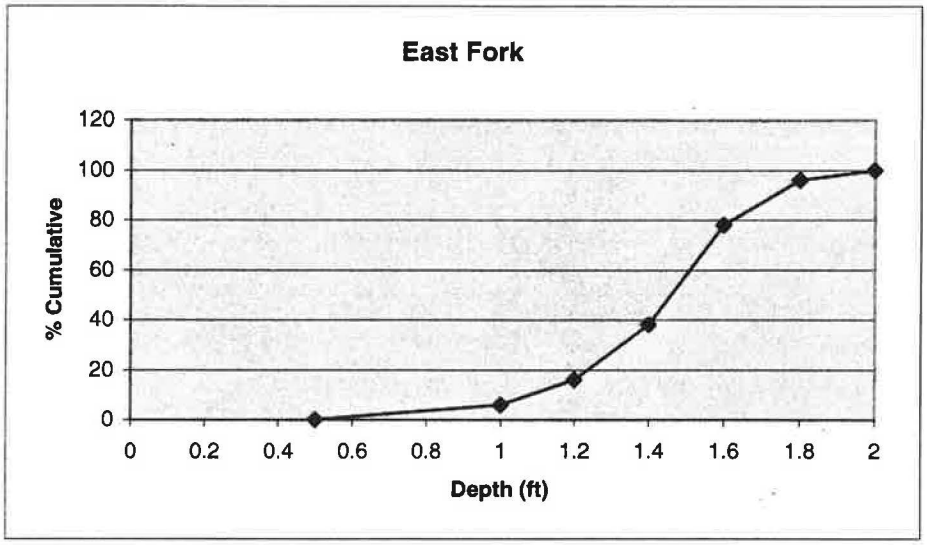
T-Walk's Tarzwell substrate ratio was used to characterize the reference reach above the confluence with San Antonio Creek and was assessed as impaired. Major reason for the rating was the amount of sands and silts in the gravels. The reach is characterized by a pool riffle system with 20 % shallow pools.

Thalwag Depths

A major impact to diversity and production is the loss of pool depth and loss of macroinvertebrate production. Changes in either one or both parameters are suitable measures for a variety of land use impacts. The pool depths over the reference reaches are covered in the following Thalwag depth graphs. Macroinvertebrates are covered in a benthic survey later in this document. This data can be compared to future Thalwag depths to monitor changes in thalwag conditions and stream bottom characteristics.

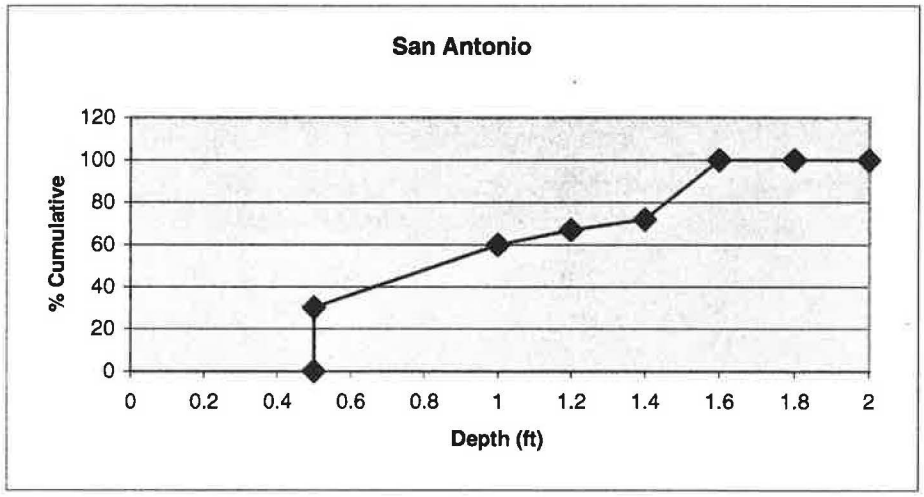
EAST FORK

% Cumulative	Depth
0	0.5
6	1
16	1.2
38	1.4
78	1.6
96	1.8
100	2



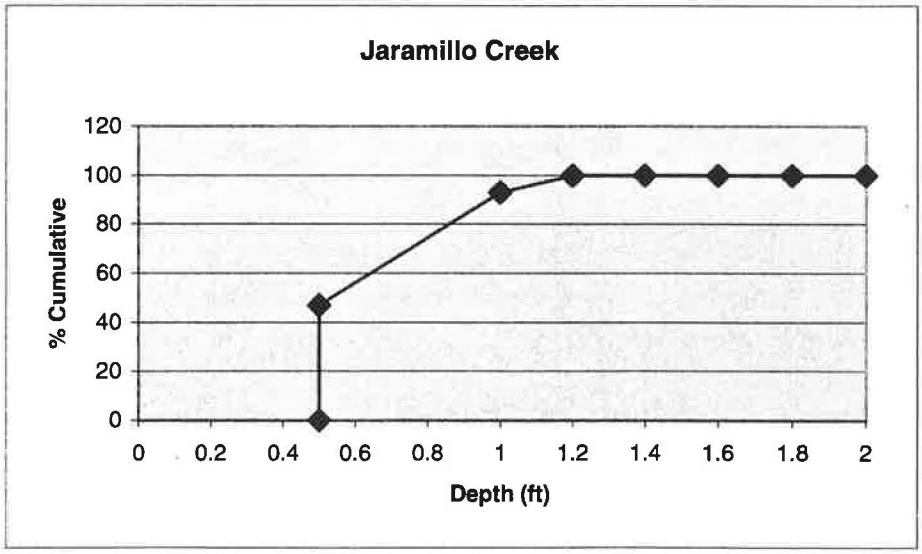
SAN ANTONIO

% Cumulative	Depth
0	0.5
30	0.5
60	1
67	1.2
72	1.4
100	1.6
100	1.8
100	2



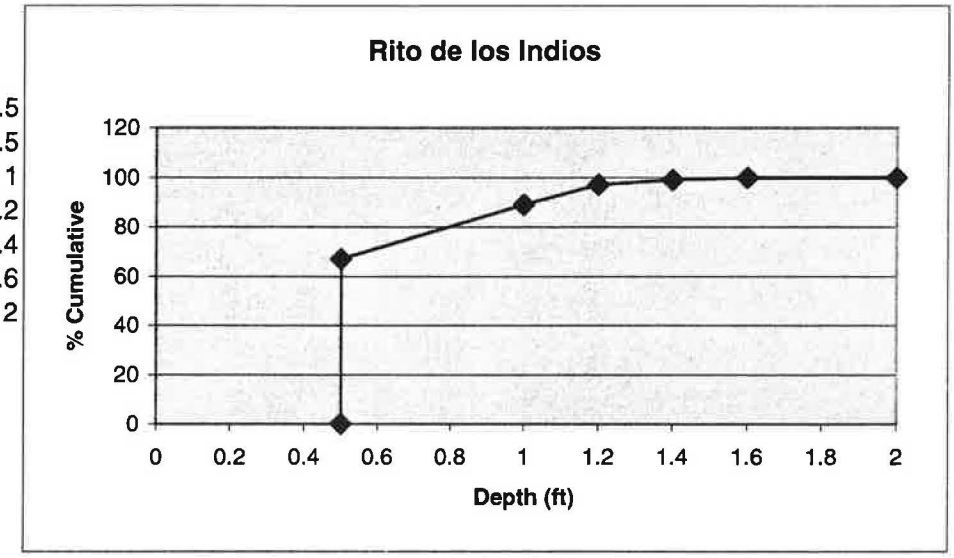
Jaramillo

% Cumulative	Depth
0	0.5
47	0.5
93	1
100	1.2
100	1.4
100	1.6
100	1.8
100	2



Rito de los Indios

% Cumulative	Depth
0	0.5
67	0.5
89	1
97	1.2
99	1.4
100	1.6
100	2



	% Cumulative			
Depth	E Fork	San Ant	Jaramil	Indios
0	0	0	0	0
0.5	0	30	47	67
1	6	60	93	89
1.2	16	67	100	97
1.4	38	72	100	99
1.6	78	100	100	100
1.8	96	100	100	100
2	100	100	100	100

